Tranquility® 20 (TS) Series

Tranquility® 16 (TC) Series

Commercial Horizontal & Vertical Packaged Water-Source Heat Pumps

50Hz-HFC-410A

Installation, Operation & Maintenance

97B0075N02
Revised: 02 January, 2013

CLIMATEMASTER®
Water-Source Heat Pump Systems

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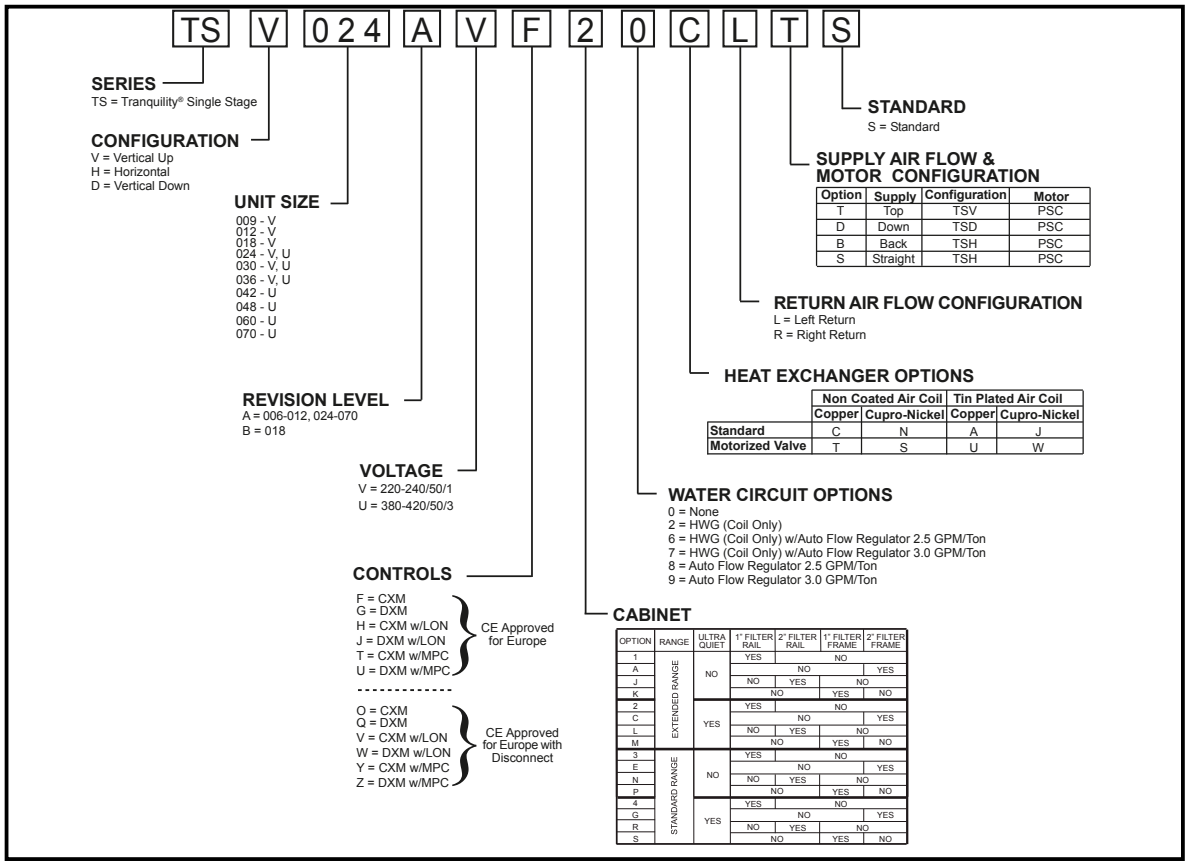
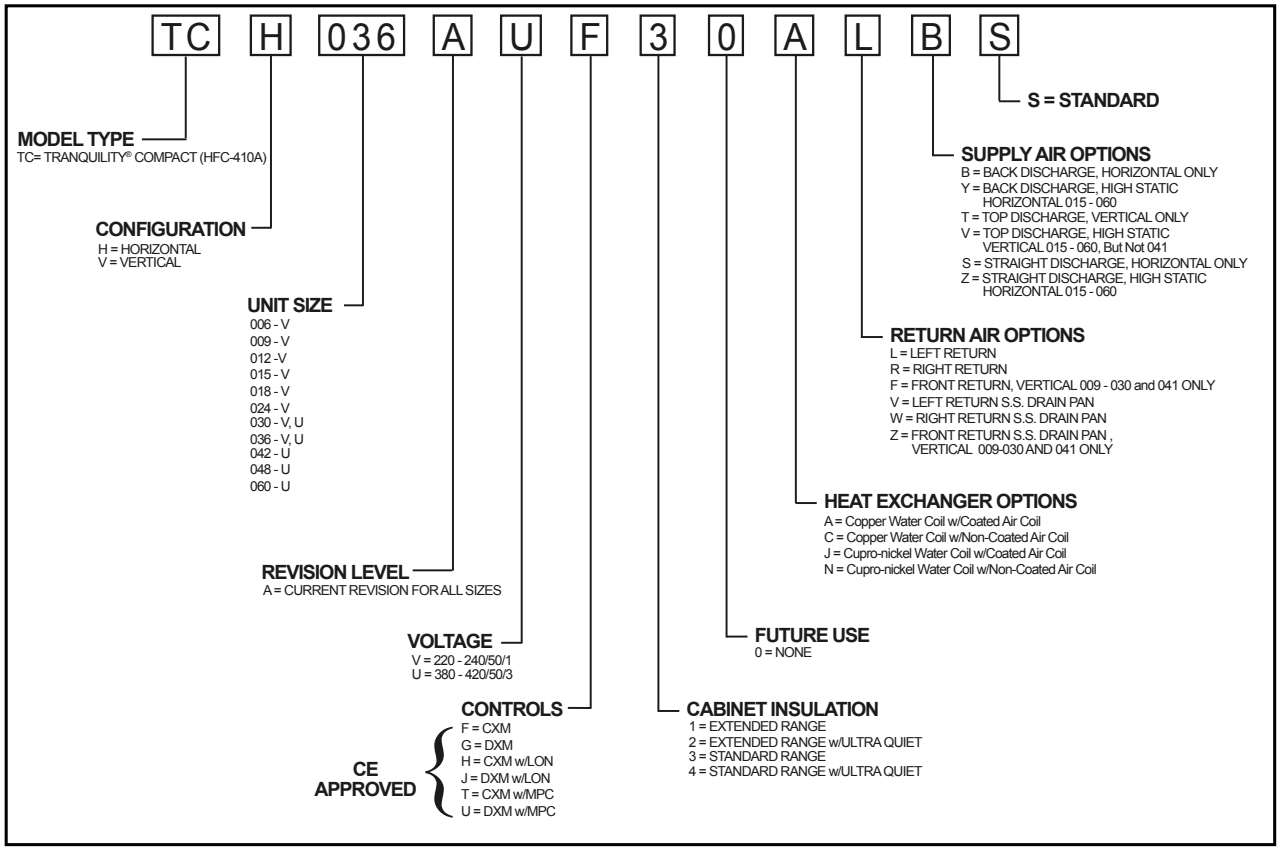
Model Nomenclature
General Overview For All H & V Series



Option	Supply	Configuration	Motor
T	Top	TSV	PSC
D	Down	TSD	PSC
B	Back	TSH	PSC
S	Straight	TSH	PSC

	Non Coated Air Coil		Tin Plated Air Coil	
	Copper	Cupro-Nickel	Copper	Cupro-Nickel
Standard	C	N	A	J
Motorized Valve	T	S	U	W

OPTION	RANGE	ULTRA QUIET	1" FILTER RAIL	2" FILTER RAIL	1" FILTER FRAME	2" FILTER FRAME
1	EXTENDED RANGE	NO	YES		NO	
A			NO			YES
J			NO	YES	NO	
K			NO		YES	NO
2		YES	YES		NO	
C			NO			YES
L			NO	YES	NO	
M			NO		YES	NO
3	STANDARD RANGE	NO	YES		NO	
E			NO			YES
N			NO	YES	NO	
P			NO		YES	NO
4		YES	YES		NO	
G			NO			YES
R			NO	YES	NO	
S			NO		YES	NO


TC H 036 A U F 3 0 A L B S
MODEL TYPE
TC= TRANQUILITY® COMPACT (HFC-410A)
CONFIGURATION
H = HORIZONTAL
V = VERTICAL
UNIT SIZE
006 - V
009 - V
012 -V
015 - V
018 - V
024 - V
030 - V, U
036 - V, U
042 - U
048 - U
060 - U
REVISION LEVEL
A = CURRENT REVISION FOR ALL SIZES
VOLTAGE
V = 220 - 240/50/1
U = 380 - 420/50/3
CONTROLS
CE APPROVED
F = CXM
G = DXM
H = CXM w/LON
J = DXM w/LON
T = CXM w/MPC
U = DXM w/MPC
CABINET INSULATION
1 = EXTENDED RANGE
2 = EXTENDED RANGE w/ULTRA QUIET
3 = STANDARD RANGE
4 = STANDARD RANGE w/ULTRA QUIET
FUTURE USE
0 = NONE
HEAT EXCHANGER OPTIONS
A = Copper Water Coil w/Coated Air Coil
C = Copper Water Coil w/Non-Coated Air Coil
J = Cupro-nickel Water Coil w/Coated Air Coil
N = Cupro-nickel Water Coil w/Non-Coated Air Coil
RETURN AIR OPTIONS
L = LEFT RETURN
R = RIGHT RETURN
F = FRONT RETURN, VERTICAL 009 - 030 and 041 ONLY
V = LEFT RETURN S.S. DRAIN PAN
W = RIGHT RETURN S.S. DRAIN PAN
Z = FRONT RETURN S.S. DRAIN PAN , VERTICAL 009-030 AND 041 ONLY
SUPPLY AIR OPTIONS
B = BACK DISCHARGE, HORIZONTAL ONLY
Y = BACK DISCHARGE, HIGH STATIC HORIZONTAL 015 - 060
T = TOP DISCHARGE, VERTICAL ONLY
V = TOP DISCHARGE, HIGH STATIC VERTICAL 015 - 060, But Not 041
S = STRAIGHT DISCHARGE, HORIZONTAL ONLY
Z = STRAIGHT DISCHARGE, HIGH STATIC HORIZONTAL 015 - 060
S = STANDARD

NOTE: Above model nomenclature is a general reference. Consult individual engineering guides for detailed information.

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General Information

Safety

Warnings, cautions, and notices appear throughout this manual. Read these items carefully before attempting any installation, service, or troubleshooting of the equipment.

DANGER: Indicates an immediate hazardous situation, which if not avoided will result in death or serious injury. DANGER labels on unit access panels must be observed.

WARNING: Indicates a potentially hazardous situation, which if not avoided could result in death or serious injury.

CAUTION: Indicates a potentially hazardous situation or an unsafe practice, which if not avoided could result in minor or moderate injury or product or property damage.

NOTICE: Notification of installation, operation, or maintenance information, which is important, but which is not hazard-related.

⚠ WARNING! ⚠

WARNING! The EarthPure® Application and Service Manual should be read and understood before attempting to service refrigerant circuits with HFC-410A.

⚠ WARNING! ⚠

WARNING! To avoid the release of refrigerant into the atmosphere, the refrigerant circuit of this unit must be serviced only by technicians who meet local, state, and federal proficiency requirements.

⚠ CAUTION! ⚠

CAUTION! To avoid equipment damage, DO NOT use these units as a source of heating or cooling during the construction process. The mechanical components and filters will quickly become clogged with construction dirt and debris, which may cause system damage.

⚠ WARNING! ⚠

WARNING! All refrigerant discharged from this unit must be recovered WITHOUT EXCEPTION. Technicians must follow industry accepted guidelines and all local, state, and federal statutes for the recovery and disposal of refrigerants. If a compressor is removed from this unit, refrigerant circuit oil will remain in the compressor. To avoid leakage of compressor oil, refrigerant lines of the compressor must be sealed after it is removed.

Inspection

Upon receipt of the equipment, carefully check the shipment against the bill of lading. Make sure all units have been received. Inspect the packaging of each unit, and inspect each unit for damage. Ensure that the carrier makes proper notation of any shortages or damage on all copies of the freight bill and completes a common carrier inspection report. Concealed damage not discovered during unloading must be reported to the carrier within 15 days of receipt of shipment. If not filed within 15 days, the freight company can deny the claim without recourse. Note: It is the responsibility of the purchaser to file all necessary claims with the carrier. Notify your equipment supplier of all damage within fifteen (15) days of shipment.

Storage

Equipment should be stored in its original packaging in a clean, dry area. Store units in an upright position at all times. Stack units a maximum of 3 units high.

Unit Protection

Cover units on the job site with either the original packaging or an equivalent protective covering. Cap the open ends of pipes stored on the job site. In areas where painting, plastering, and/or spraying has not been completed, all due precautions must be taken to avoid physical damage to the units and contamination by foreign material. Physical damage and contamination may prevent proper start-up and may result in costly equipment clean-up.

Examine all pipes, fittings, and valves before installing any of the system components. Remove any dirt or debris found in or on these components.

Pre-Installation
Installation, Operation, and Maintenance instructions are provided with each unit. Horizontal equipment is designed for installation above false ceiling or in a ceiling plenum. Other unit configurations are typically installed in a mechanical room. The installation site chosen should include adequate service clearance around the unit. Before unit start-up, read all manuals and become familiar with the unit and its operation. Thoroughly check the system before operation.

Prepare units for installation as follows:

1. Compare the electrical data on the unit nameplate with ordering and shipping information to verify that the correct unit has been shipped.
2. Keep the cabinet covered with the original packaging until installation is complete and all plastering, painting, etc. is finished.
3. Verify refrigerant tubing is free of kinks or dents and that it does not touch other unit components.
4. Inspect all electrical connections. Connections must be clean and tight at the terminals.
5. Remove any blower support packaging (water-to-air units only).
6. Loosen compressor bolts on units equipped with compressor spring vibration isolation until the compressor rides freely on the springs. Remove shipping restraints.
7. Some airflow patterns are field convertible (horizontal units only). Locate the airflow conversion section of this IOM.
8. Locate and verify any hot water generator (HWG), hanger, or other accessory kit located in the compressor section or blower section.

⚠ CAUTION! ⚠

CAUTION! All three phase scroll compressors must have direction of rotation verified at start-up. Verification is achieved by checking compressor Amp draw. Amp draw will be substantially lower compared to nameplate values. Additionally, reverse rotation results in an elevated sound level compared to correct rotation. Reverse rotation will result in compressor internal overload trip within several minutes. Verify compressor type before proceeding.

⚠ CAUTION! ⚠

CAUTION! DO NOT store or install units in corrosive environments or in locations subject to temperature or humidity extremes (e.g., attics, garages, rooftops, etc.). Corrosive conditions and high temperature or humidity can significantly reduce performance, reliability, and service life. Always move and store units in an upright position. Tilting units on their sides may cause equipment damage.

⚠ CAUTION! ⚠

CAUTION! CUT HAZARD - Failure to follow this caution may result in personal injury. Sheet metal parts may have sharp edges or burrs. Use care and wear appropriate protective clothing, safety glasses and gloves when handling parts and servicing heat pumps.

NOTICE! Failure to remove shipping brackets from spring-mounted compressors will cause excessive noise, and could cause component failure due to added vibration.

Packaged Units
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Unit Physical Data

Tranquility® 20 Single-Stage (TS) Series (50Hz)

Model	009	012	018	024	030	036	042	048	060	070
Compressor (1 Each)	Rotary		Scroll							
Factory Charge HFC-410A [kg]	0.88	0.96	1.13	1.59	1.64	1.98	2.27	2.27	3.86	4.08
PSC Fan Motor & Blower (3 Speeds)										
Fan Motor [W]	37	93	124	149	249	373	373	560	746	746
High Static Fan Motor [W]	N/A	N/A	149	249	373	373	560	560	746	Not Available
Blower Wheel Size (dia x w) - [mm]	6 X 5	6 X 5	9 x 7	9 x 7	9 x 7	10 x 10	10 x 10	10 x 10	11 x 10	11 x 10
Water Connection Size										
FPT (in)	1/2”	1/2”	3/4”	3/4”	3/4”	3/4”	1”	1”	1”	1”
HWG Connection Size										
FPT (in)	N/A	N/A	1/2”	1/2”	1/2”	1/2”	1/2”	1/2”	1/2”	1/2”
Coax Volume										
Volume [liters]	1.10	1.70	2.12	2.88	2.88	3.48	4.69	4.69	5.91	5.91
Vertical Upflow/Downflow										
Air Coil Dimensions (h x w) - [mm]	406 x 406 Upflow Only	406 x 406 Upflow Only	610 x 508	711 x 508	711 x 508	711 x 635	813 x 635	813 x 635	914 x 635	914 x 635
Standard Filter - [25.4mm] Throwaway, qty [mm]	406 x 508	406 x 508	610 x 610	711 x 610	711 x 610	711 x 762	2 - 406 x 762	2 - 406 x 762	1 - 406 x 762; 1 - 508 x 762	1 - 406 x 762; 1 - 508 x 762
Weight - Operating, [kg]	66	68	114	121	122	148	188	189	200	201
Weight - Packaged, [kg]	71	73	119	125	126	153	192	193	205	206
Horizontal										
Air Coil Dimensions (h x w) - [mm]	406 x 406	406 x 406	457 x 686	457 x 787	457 x 787	508 x 889	508 x 1016	508 x 1016	508 x 1143	508 x 1143
Standard Filter - [25.4mm] Throwaway, qty [mm]	406 x 508	406 x 508	2 - 457 x 457	2 - 457 x 457	2 - 457 x 457	1 - 305 x 508; 1 - 508 x 635	1 - 457 x 508; 1 - 508 x 610	1 - 457 x 508; 1 - 508 x 610	2 - 508 x 610	2 - 508 x 610
Weight - Operating, [kg]	71	73	117	121	122	148	188	189	200	201
Weight - Packaged, [kg]	72	77	121	125	126	153	192	193	205	206

All units have dual vibration isolation compressor mounts for quiet operation, thermal expansion valves for refrigerant metering, and 22.2 mm & 28.6 mm electrical knockouts to accommodate field wiring.
FPT - Female Pipe Thread
Condensate Drain Connection is 3/4” FPT

Unit Maximum Water Working Pressure	
Options	Max Pressure kPa
Base Unit	2,068
Internal Motorized Water Valve (MWV)	2,068
Internal Auto Flow Valve	2,068

Use the lowest maximum pressure rating when multiple options are combined.

Tranquility® 16 (TC) Series (50 Hz)

TC Series	006	009	012	015	018	024	030	036	042	048	060
Compressor (1 Each)		Rotary				Scroll					
Factory Charge HFC-410A - kg	0.48	0.52	.65	0.91	1.22	1.22	1.36	1.42	1.98	2.10	2.32
PSC Fan Motor & Blower											
Fan Motor Type/Speeds	PSC/3	PSC/3	PSC/3	PSC/3	PSC/3	PSC/3	PSC/3	PSC/3	PSC/3	PSC/3	PSC/3
Fan Motor (Watts)	30	75	75	124	124	187	560	373	560	560	746
Blower Wheel Size (Dia x w) mm	127 x 127	127 x 127	152 x 127	203 x 178		229 x 178		229 x 203		254 x 254	279 x 254
Water Connection Size											
FPT	1/2”	1/2"	1/2”	1/2"	1/2"	3/4"	3/4"	3/4"	3/4"	1"	1"
Coax Volume (liters)	.47	.54	.63	1.08	1.70	1.08	1.22	1.22	3.37	2.79	3.55
Vertical											
Air Coil Dimensions (H x W) mm	254 x 381	254x381	254 x 381	508 x 438	508 x 438	508 x 438	508 x 438	610 x 552	610 x 552	610 x 718	610 x 718
Filter Standard - 25.4mm Throwaway mm	254 x 457	254x457	254 x 457	508 x 508	508 x 508	508 x 508	508 x 508	610 x 610	610 x 610	1-356 x 610, 1- 457 x 610	1-356 x 610, 1- 457 x 610
Weight - Operating kg	47	48	52	69	72	86	89	92	99	119	126
Weight - Packaged kg	51	52	56	72	74	88	92	95	102	123	129
Horizontal											
Air Coil Dimensions (H x W) mm	254 x 381	254 x 381	254 x 381	406 x 559	406 x 559	406 x 559	406 x 559	508 x 635	508 x 635	508 x 889	508 x 889
Filter Standard - 25.4mm Throwaway mm	254 x 457	254 x 457	254 x 457	406 x 635	406 x 635	457 x 635	457 x 635	508 x 711 or (2) 508 x 356	508 x 711 or (2) 508 x 356	1-508 x 610, 1-508 x 356	1-508 x 610, 1-508 x 356
Weight - Operating kg	47	47	52	69	72	86	89	92	99	119	138
Weight - Packaged kg	51	52	56	72	74	88	92	95	102	123	141

Notes:
All units have dual isolation compressor mounts for quiet operation, thermal expansion valves for refrigerant metering, and 22.2mm & 28.6mm electrical knockouts to accommodate field wiring.
FPT - Female Pipe Thread
Condensate Drain Connection is 3/4” FPT

Unit Maximum Water Working Pressure	
Options	Max Pressure kPa
Base Unit	2,068

Use the lowest maximum pressure rating when multiple options are combined.

Packaged Units
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Horizontal Installation

Horizontal Unit Location

Units are not designed for outdoor installation. Locate the unit in an INDOOR area that allows enough space for service personnel to perform typical maintenance or repairs without removing unit from the ceiling. Horizontal units are typically installed above a false ceiling or in a ceiling plenum. Never install units in areas subject to freezing or where humidity levels could cause cabinet condensation (such as unconditioned spaces subject to 100% outside air). Consideration should be given to access for easy removal of the filter and access panels. Provide sufficient room to make water, electrical, and duct connection(s).

If the unit is located in a confined space, such as a closet, provisions must be made for return air to freely enter the space by means of a louvered door, etc. Any access panel screws that would be difficult to remove after the unit is installed should be removed prior to setting the unit. Refer to Figure 3 for an illustration of a typical installation. Refer to unit submittal data or engineering design guide for dimensional data.

In limited side access installations, pre-removal of the control box side mounting screws will allow control box removal for future servicing.

Conform to the following guidelines when selecting unit location:

1. Provide a hinged access door in concealed-spline or plaster ceilings. Provide removable ceiling tiles in T-bar or lay-in ceilings. Refer to horizontal unit dimensions for specific series and model in unit submittal data. Size the access opening to accommodate the service technician during the removal or replacement of the compressor and the removal or installation of the unit itself.
2. Provide access to hanger brackets, water valves and fittings. Provide screwdriver clearance to access panels, discharge collars and all electrical connections.
3. DO NOT obstruct the space beneath the unit with piping, electrical cables and other items that prohibit future removal of components or the unit itself.
4. Use a manual portable jack/lift to lift and support the weight of the unit during installation and servicing.

The installation of water source heat pump units and all associated components, parts and accessories which make up the installation shall be in accordance with the regulations of ALL authorities having jurisdiction and MUST conform to all applicable codes. It is the responsibility of the installing contractor to determine and comply with ALL applicable codes and regulations.

Mounting Horizontal Units

Horizontal units have hanger kits pre-installed from the factory as shown in figure 1. Figure 3 shows a typical horizontal unit installation.

Horizontal heat pumps are typically suspended above a ceiling or within a soffit using field supplied, threaded rods sized to support the weight of the unit.

Use four (4) field supplied threaded rods and factory provided vibration isolators to suspend the unit. Hang the unit clear of the floor slab above and support the unit by the mounting bracket assemblies only. DO NOT attach the unit flush with the floor slab above.

Pitch the unit toward the drain as shown in Figure 2 to improve the condensate drainage. On small units (less than 8.8 kW) ensure that unit pitch does not cause condensate leaks inside the cabinet.

Figure 1: Hanger Bracket

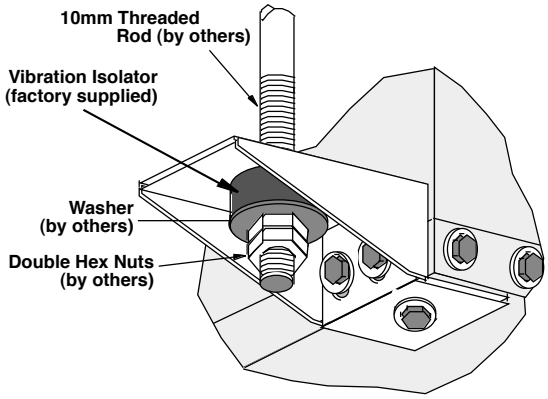


Figure 2: Horizontal Unit Pitch

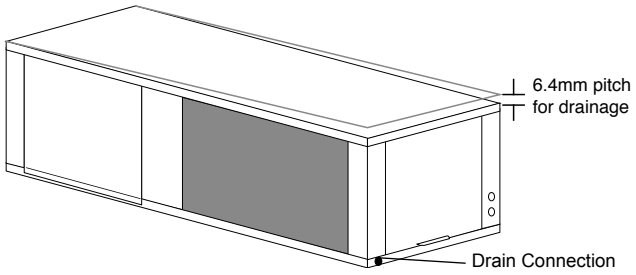
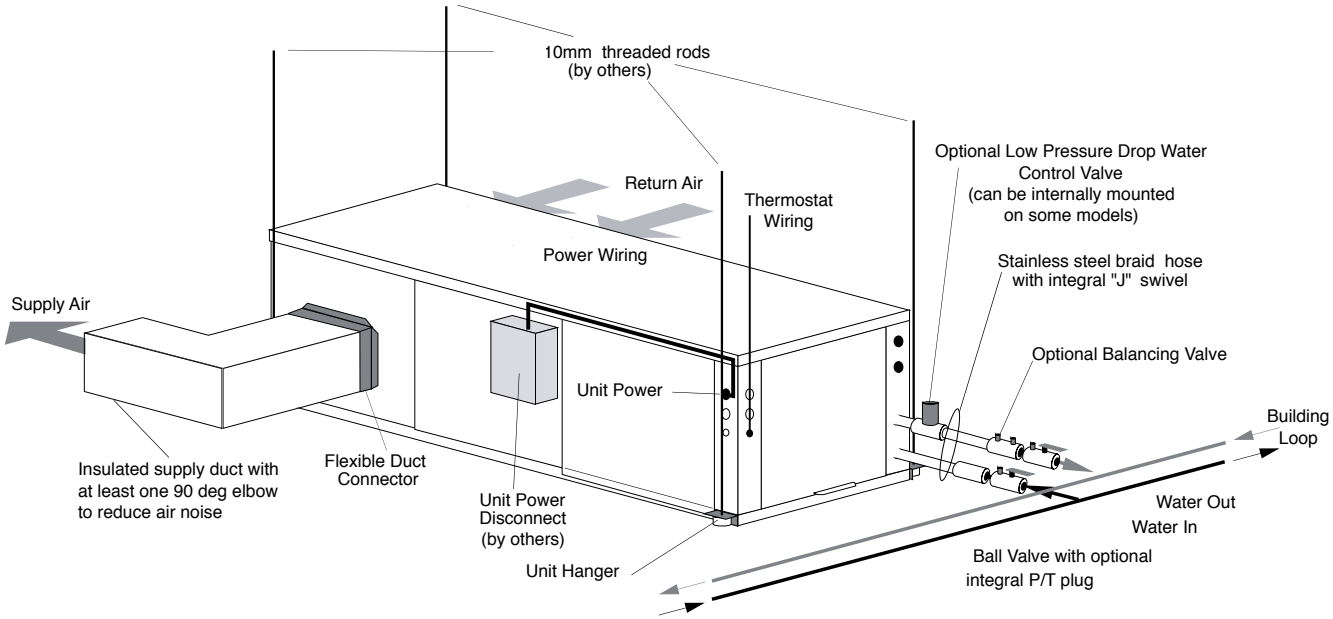


Figure 3: Typical Horizontal Unit Installation



Air Coil - To obtain maximum performance, the air coil should be cleaned before start-up. A 10% solution of dishwasher detergent and water is recommended for both sides of the coil. A thorough water rinse should follow. **UV based anti-bacterial systems may damage coated air coils.**

Notice! Installation Note - Ducted Return: Many horizontal WSHPs are installed in a return air ceiling plenum application (above ceiling). Vertical WSHPs are commonly installed in a mechanical room with free return (e.g. louvered door). Therefore, filter rails are the industry standard and are included on ClimateMaster commercial heat pumps for the purposes of holding the filter only. For ducted return applications, the filter rail must be removed and replaced with a duct flange or filter rack. Canvas or flexible connectors should also be used to minimize vibration between the unit and ductwork.

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Field Conversion of Air Discharge

Overview - Horizontal units can be field converted between straight (side) and back (end) discharge using the instructions below.

Note: It is not possible to field convert return air between left or right return models due to the necessity of refrigeration copper piping changes.

Preparation - Field conversion must be completed on the ground. If the unit is already hung it should be taken down for the field conversion. Place in a well-lighted area. Conversion should only be attempted by a qualified service technician.

Side to Back Discharge Conversion

1. Remove back panel and side access panel
2. Loosen 2 motor slide nuts, raise motor slide assembly and remove belt and motor sheave.
3. Remove blower sheave. Remove motor bolts and carefully remove motor.
4. Remove 2 motor clips and reattach to opposite side.
5. Unbolt (3 per side) complete housing assembly.
6. Rotate complete assembly into new position. Locate over mounting holes in base, reattach using 3 bolts per side.
7. Mount motor, motor sheave, blower sheave and belt. Make sure wires are not pinched and not over sharp edges. Adjust motor downward to tighten belt. Raise or lower motor slide assembly with adjusting bolt and retighten 2 slide nuts. Check for correct tension (See Tensioning V-Belt Drives page). Rewire motor (at contactor) for correct rotation. Spin blower wheel to ensure wheel is not obstructed.
8. Replace 2 panels.

Back to Side Discharge Conversion - If the discharge is changed from back to side, use above instruction noting that illustrations will be reversed.

Left vs. Right Return - It is not possible to field convert return air between left or right return models due to the necessity of refrigeration copper piping changes. However, the conversion process of side to back or back to side discharge for either right or left return configuration is the same. In some cases, it may be possible to rotate the entire unit 180 degrees if the return air connection needs to be on the opposite side. Note that rotating the unit will move the piping to the other end of the unit.

Figure 4: Left Return Side to Back

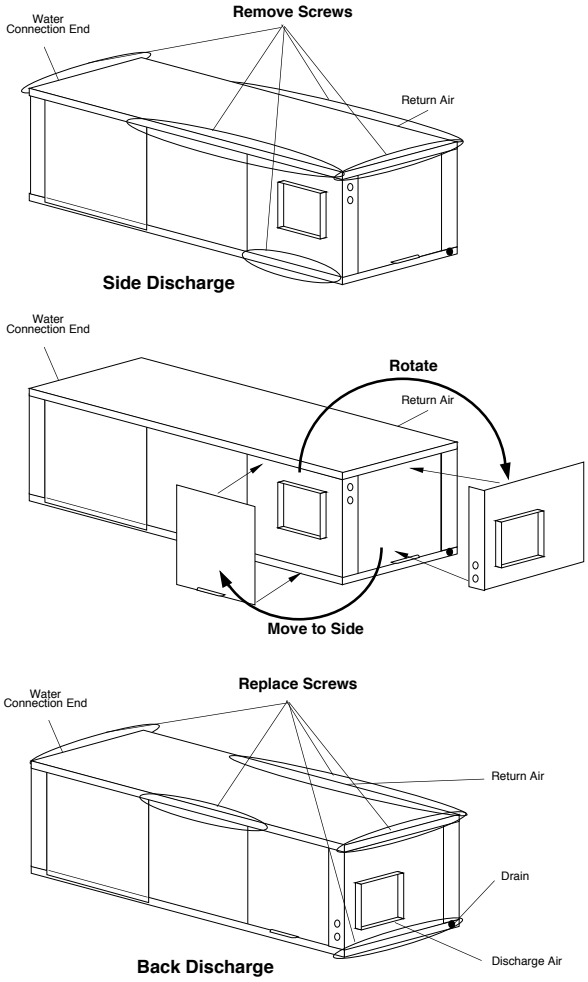
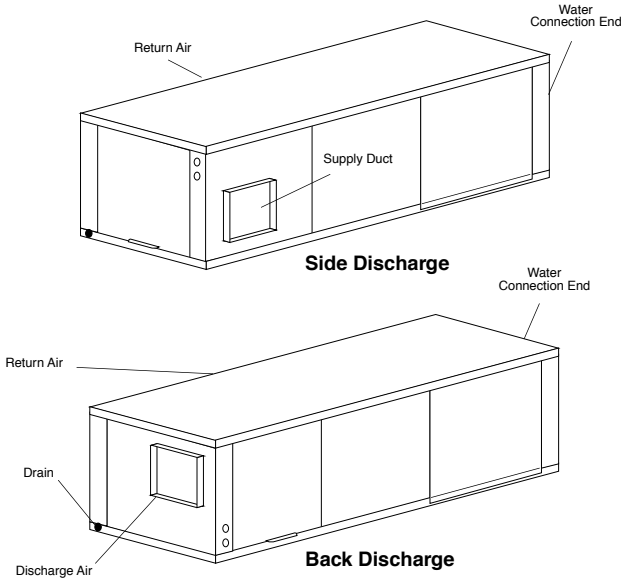


Figure 5: Right Return Side to Back



Horizontal Installation

Condensate Piping - Horizontal Units - A condensate drain line must be installed and pitched away for the unit to allow for proper drainage. This connection must meet all local plumbing/building codes.

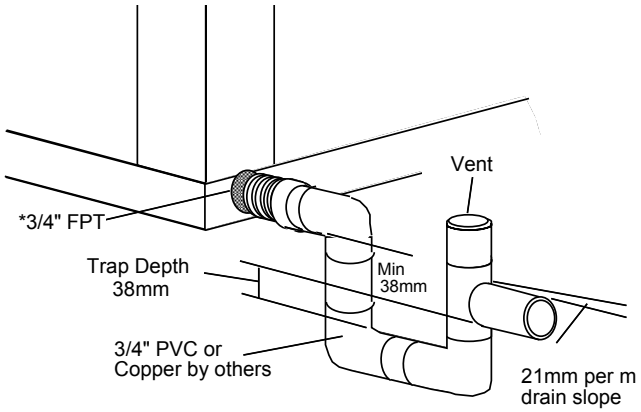
Pitch the unit toward the drain as shown in Figure 2 to improve the condensate drainage. On small units (less than 8.8 kW), ensure that unit pitch does not cause condensate leaks inside the cabinet.

Install condensate trap at each unit with the top of the trap positioned below the unit condensate drain connection as shown in Figure 6. Design the depth of the trap (water-seal) based upon the amount of ESP capability of the blower (where 51mm of ESP capability requires 51mm of trap depth). As a general rule, 38mm trap depth is the minimum.

Each unit must be installed with its own individual trap and connection to the condensate line (main) or riser. Provide a means to flush or blow out the condensate line. **DO NOT install units with a common trap and/or vent.**

Always vent the condensate line when dirt or air can collect in the line or a long horizontal drain line is required. Also vent when large units are working against higher external static pressure than other units connected to the same condensate main since this may cause poor drainage for all units on the line. **WHEN A VENT IS INSTALLED IN THE DRAIN LINE, IT MUST BE LOCATED AFTER THE TRAP IN THE DIRECTION OF THE CONDENSATE FLOW.**

Figure 6: Horizontal Condensate Connection



* Some units include a painted drain connection. Using a threaded pipe or similar device to clear any excess paint accumulated inside this fitting may ease final drain line installation.

Rev.: 7/30/10

⚠ CAUTION! ⚠

CAUTION! Ensure condensate line is pitched toward drain 21mm per m of run.

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Duct System Installation

Duct System Installation - Proper duct sizing and design is critical to the performance of the unit. The duct system should be designed to allow adequate and even airflow through the unit during operation. Air flow through the unit MUST be at or above the minimum stated airflow for the unit to avoid equipment damage. Duct systems should be designed for quiet operation. Refer to Figure 3 for horizontal duct system details or Figure 8 for vertical duct system details. A flexible connector is recommended for both discharge and return air duct connections on metal duct systems to eliminate the transfer of vibration to the duct system. To maximize sound attenuation of the unit blower, the supply and return plenums should include internal fiberglass duct liner or be constructed from ductboard for the first few feet. Application of the unit to uninsulated ductwork in an unconditioned space is not recommended, as the unit's performance may be adversely affected.

At least one 90° elbow should be included in the supply duct to reduce air noise. If air noise or excessive air flow is a problem, the blower speed can be changed. For airflow charts, consult submittal data for the series and model of the specific unit.

If the unit is connected to existing ductwork, a previous check should have been made to ensure that the ductwork has the capacity to handle the airflow required for the unit. If ducting is too small, as in the replacement of a heating only system, larger ductwork should be installed. All existing ductwork should be checked for leaks and repaired as necessary.

Vertical Installation

Vertical Unit Location

Units are not designed for outdoor installation. Locate the unit in an INDOOR area that allows enough space for service personnel to perform typical maintenance or repairs without removing unit from the mechanical room/closet. Vertical units are typically installed in a mechanical room or closet. Never install units in areas subject to freezing or where humidity levels could cause cabinet condensation (such as unconditioned spaces subject to 100% outside air). Consideration should be given to access for easy removal of the filter and access panels. Provide sufficient room to make water, electrical, and duct connection(s).

If the unit is located in a confined space, such as a closet, provisions must be made for return air to freely enter the space by means of a louvered door, etc. Any access panel screws that would be difficult to remove after the unit is installed should be removed prior to setting the unit. Refer to Figures 7 and 8 for typical installation illustrations. Refer to unit submittal data or engineering design guide for dimensional data.

1. Install the unit on a piece of rubber, neoprene or other mounting pad material for sound isolation. The pad should be at least 10mm to 13mm in thickness. Extend the pad beyond all four edges of the unit.
2. Provide adequate clearance for filter replacement and drain pan cleaning. Do not block filter access with piping, conduit or other materials. Refer to unit submittal data or engineering design guide for dimensional data.
3. Provide access for fan and fan motor maintenance and for servicing the compressor and coils without removing the unit.
4. Provide an unobstructed path to the unit within the closet or mechanical room. Space should be sufficient to allow removal of the unit, if necessary.
5. In limited side access installations, pre-removal of the control box side mounting screws will allow control box removal for future servicing (TC units only).
6. Provide access to water valves and fittings and screwdriver access to the unit side panels, discharge collar and all electrical connections.

Figure 7: Typical Vertical Unit Mounting

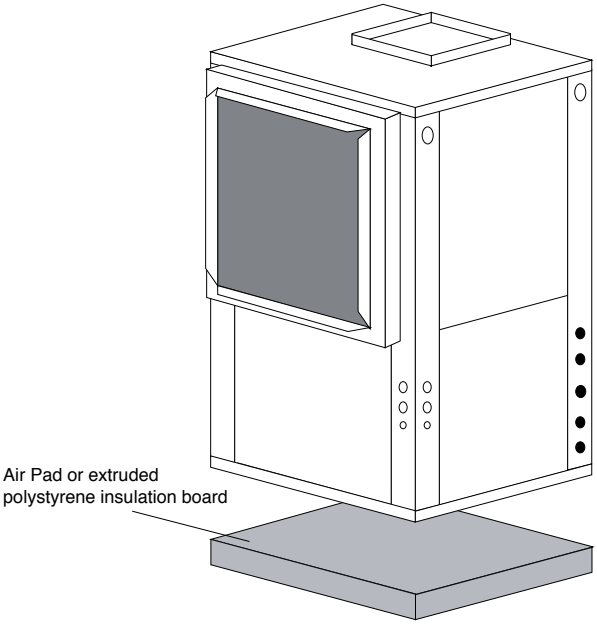
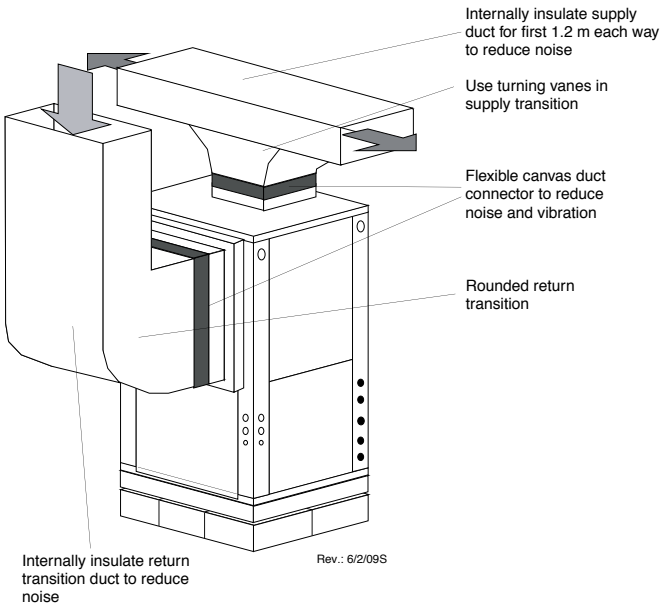


Figure 8: Typical Vertical Unit Installation Using Ducted Return Air


Internally insulate supply duct for first 1.2 m each way to reduce noise
Use turning vanes in supply transition
Flexible canvas duct connector to reduce noise and vibration
Rounded return transition
Internally insulate return transition duct to reduce noise
Rev.: 6/2/09S

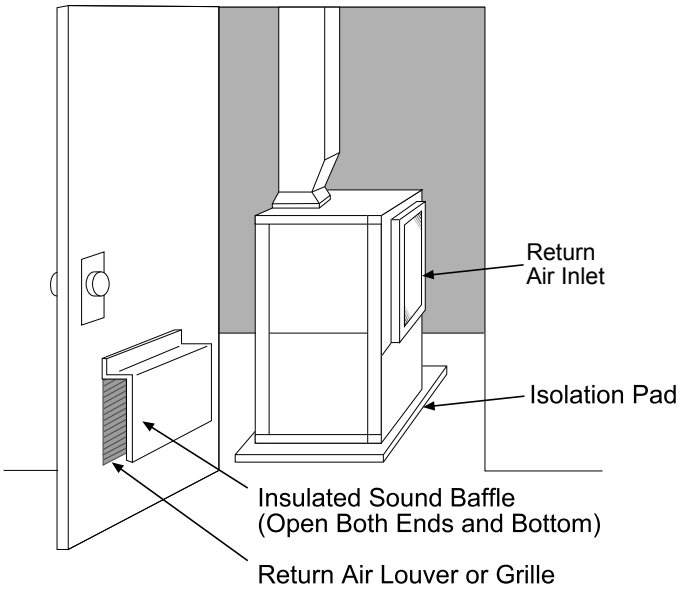
Packaged Units
Revised: 02 January, 2013

Vertical Installation

Sound Attenuation for Vertical Units - Sound attenuation is achieved by enclosing the unit within a small mechanical room or a closet. Additional measures for sound control include the following:

1. Mount the unit so that the return air inlet is 90° to the return air grille. Refer to Figure 9. Install a sound baffle as illustrated to reduce line-of sight sound transmitted through return air grilles.
2. Mount the unit on a rubber or neoprene isolation pad to minimize vibration transmission to the building structure.

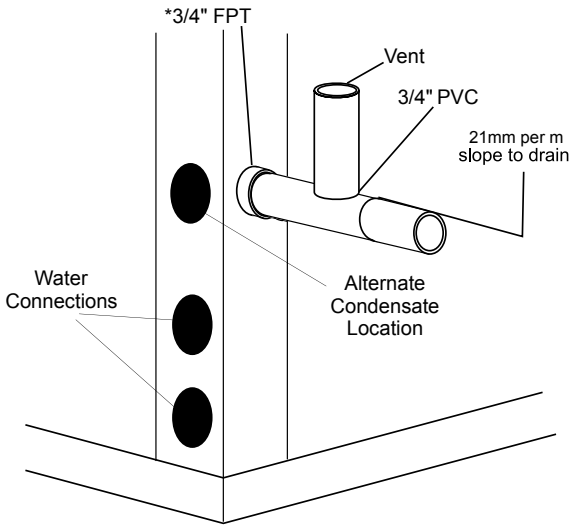
Figure 9: Vertical Sound Attenuation



Units with clear plastic drain lines should have regular maintenance (as required) to avoid buildup of debris, especially in new construction.

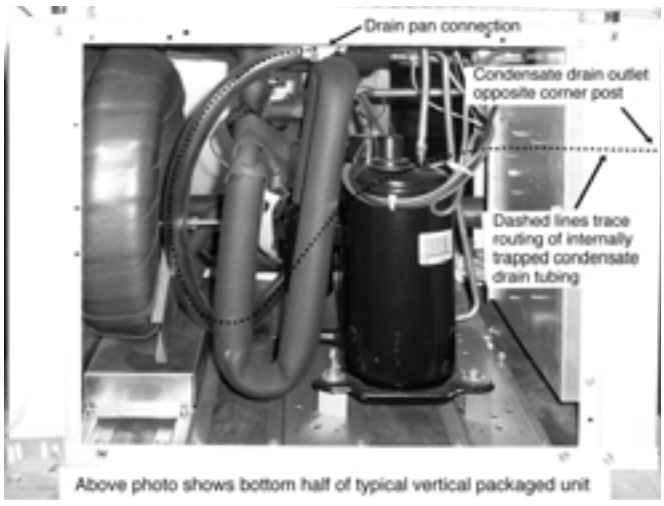
Condensate Piping for Vertical Units - A condensate line must be installed and pitched away from the unit to allow for proper drainage. This connection must meet all local plumbing/building codes. Vertical units utilize a condensate hose inside the cabinet as a trapping loop; therefore an external trap is not necessary. Figure 10a shows typical condensate connections. Figure 10b illustrates the internal trap for a typical vertical heat pump. Each unit must be installed with its own individual vent (where necessary) and a means to flush or blow out the condensate drain line. Do not install units with a common trap and/or vent.

Figure 10a: Vertical Condensate Drain



* Some units include a painted drain connection. Using a threaded pipe or similar device to clear any excess paint accumulated inside this fitting may ease final drain line installation.

Figure 10b: Vertical Internal Condensate Trap



Installation of Supply and Return Piping
Follow these piping guidelines.

1. Install a drain valve at the base of each supply and return riser to facilitate system flushing.
2. Install shut-off / balancing valves and unions at each unit to permit unit removal for servicing.
3. Place strainers at the inlet of each system circulating pump.
4. Select the proper hose length to allow slack between connection points. Hoses may vary in length by +2% to -4% under pressure.
5. Refer to Table 1. Do not exceed the minimum bend radius for the hose selected. Exceeding the minimum bend radius may cause the hose to collapse, which reduces water flow rate. Install an angle adapter to avoid sharp bends in the hose when the radius falls below the required minimum.

Insulation is not required on loop water piping except where the piping runs through unheated areas, outside the building or when the loop water temperature is below the minimum expected dew point of the pipe ambient conditions. Insulation is required if loop water temperature drops below the dew point (insulation is required for ground loop applications in most climates).

Pipe joint compound is not necessary when Teflon® thread tape is pre-applied to hose assemblies or when flared-end connections are used. If pipe joint compound is preferred, use compound only in small amounts on the external pipe threads of the fitting adapters. Prevent sealant from reaching the flared surfaces of the joint.

Note: When antifreeze is used in the loop, ensure that it is compatible with the Teflon tape or pipe joint compound that is applied.

Maximum allowable torque for brass fittings is 41 N-m. If a torque wrench is not available, tighten finger-tight plus one quarter turn. Tighten steel fittings as necessary.

Optional pressure-rated hose assemblies designed specifically for use with ClimateMaster units are available. Similar hoses can be obtained from alternate suppliers. Supply and return hoses are fitted with swivel-joint fittings at one end to prevent kinking during installation.

Refer to Figure 11 for an illustration of a typical supply/return hose kit. Adapters secure hose assemblies to the unit and risers. Install hose assemblies properly and check regularly to avoid system failure and reduced service life.

A backup wrench is required when tightening water connections to prevent water line damage for TC Series equipment. TS Series equipment has water connections secured to the corner post.

⚠ WARNING! ⚠

WARNING! Polyolester Oil, commonly known as POE oil, is a synthetic oil used in many refrigeration systems including those with HFC-410A refrigerant. POE oil, if it ever comes in contact with PVC or CPVS piping, may cause failure of the PVC/CPVC. PVC/CPVC piping should never be used as supply or return water piping with water source heat pump products containing HFC-410A as system failures and property damage may result.

⚠ CAUTION! ⚠

CAUTION! Corrosive system water requires corrosion resistant fittings and hoses, and may require water treatment.

⚠ CAUTION! ⚠

CAUTION! Do not bend or kink supply lines or hoses.

⚠ CAUTION! ⚠

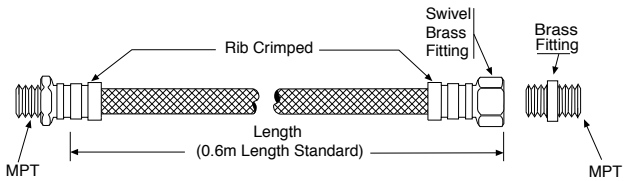
CAUTION! Piping must comply with all applicable codes.

Table 1: Metal Hose Minimum Bend Radii

Hose Diameter	Minimum Bend Radii
12.7mm	6.4cm
19.1mm	10.2cm
25.4mm	14cm
31.8mm	17.1cm

NOTICE! Do not allow hoses to rest against structural building components. Compressor vibration may be transmitted through the hoses to the structure, causing unnecessary noise complaints.

Figure 11: Supply/Return Hose Kit



Packaged Units
Revised: 02 January, 2013

Water-Loop Heat Pump Applications

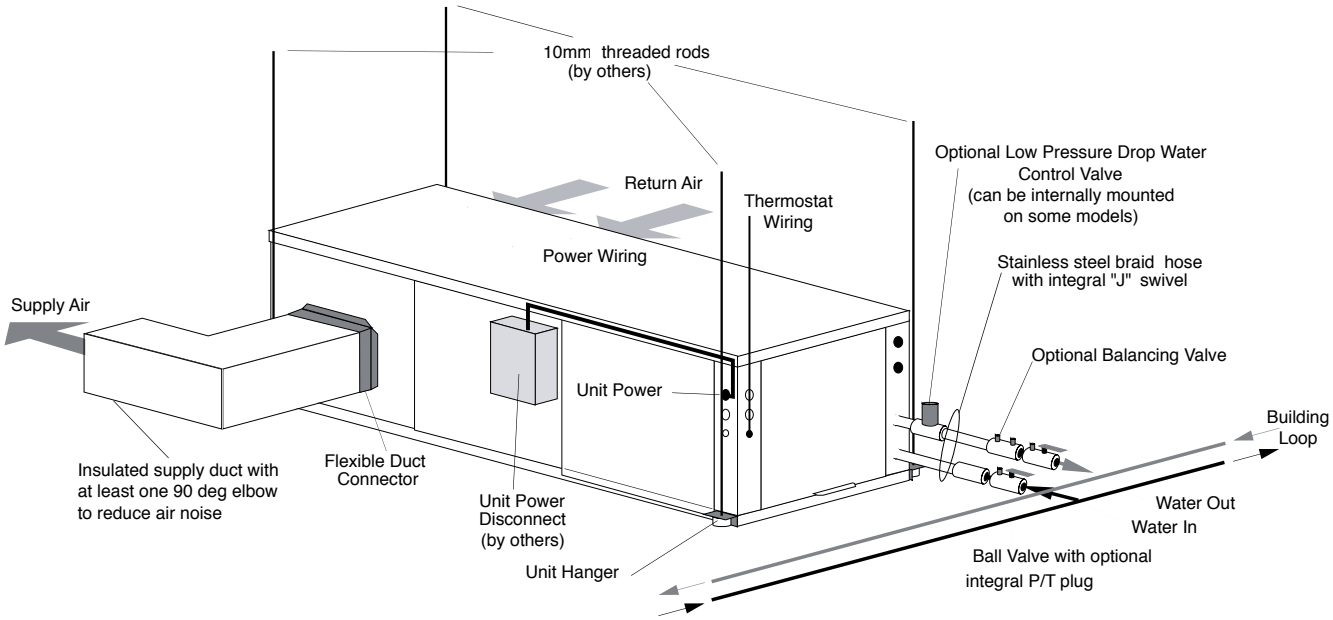
Commercial Water Loop Applications
Commercial systems typically include a number of units connected to a common piping system. Any unit plumbing maintenance work can introduce air into the piping system; therefore air elimination equipment is a major portion of the mechanical room plumbing. Consideration should be given to insulating the piping surfaces to avoid condensation. ClimateMaster recommends unit insulation any time the water temperature is expected to be below 15.6°C. Metal to plastic threaded joints should never be used due to their tendency to leak over time.

Teflon® tape thread sealant is recommended to minimize internal fouling of the heat exchanger. Do not over tighten connections and route piping so as not to interfere with service or maintenance access. Hose kits are available from ClimateMaster in different configurations as shown in Figure 12 for connection between the unit and the piping system. Depending upon selection, hose kits may include shut off valves, P/T plugs for performance measurement, high pressure stainless steel braided hose, "Y" type strainer with blow down valve, and/or "J" type swivel connection. Balancing valves and an external low pressure drop solenoid valve for use in variable speed pumping systems may also be included in the hose kit.

The piping system should be flushed to remove dirt, piping chips, and other foreign material prior to operation (see "Piping System Cleaning and Flushing Procedures" in this manual). The flow rate is usually set between 2.9 and 4.5 l/m per kW of cooling capacity. ClimateMaster recommends 3.9 l/m per kW for most applications of water loop heat pumps. To ensure proper maintenance and servicing, P/T ports are imperative for temperature and flow verification, as well as performance checks.

Water loop heat pump (cooling tower/boiler) systems typically utilize a common loop, maintained between 16 - 32°C. The use of a closed circuit evaporative cooling tower with a secondary heat exchanger between the tower and the water loop is recommended. If an open type cooling tower is used continuously, chemical treatment and filtering will be necessary.

Figure 12: Typical Water-Loop Application



Low Water Temperature Cutout Setting
CXM - When antifreeze is selected, the FP1 jumper (JW3) should be clipped to select the low temperature (antifreeze -12.2°C) setpoint and avoid nuisance faults (see "Low Water Temperature Cutout Selection" in this manual). **Note: Low water temperature operation requires extended range equipment.**

Ground-Loop Heat Pump Applications

⚠ CAUTION! ⚠

CAUTION! The following instructions represent industry accepted installation practices for closed loop earth coupled heat pump systems. Instructions are provided to assist the contractor in installing trouble free ground loops. These instructions are recommendations only. State/provincial and local codes MUST be followed and installation MUST conform to ALL applicable codes. It is the responsibility of the installing contractor to determine and comply with ALL applicable codes and regulations.

⚠ CAUTION! ⚠

CAUTION! Ground loop applications require extended range equipment and optional refrigerant/water circuit insulation.

Pre-Installation

Prior to installation, locate and mark all existing underground utilities, piping, etc. Install loops for new construction before sidewalks, patios, driveways, and other construction has begun. During construction, accurately mark all ground loop piping on the plot plan as an aid in avoiding potential future damage to the installation.

Piping Installation

The typical closed loop ground source system is shown in Figure 13. All earth loop piping materials should be limited to polyethylene fusion only for in-ground sections of the loop. Galvanized or steel fittings should not be used at any time due to their tendency to corrode. All plastic to metal threaded fittings should be avoided due to their potential to leak in earth coupled applications. A flanged fitting should be substituted. P/T plugs should be used so that flow can be measured using the pressure drop of the unit heat exchanger.

Earth loop temperatures can range between -4 to 43°C. Flow rates between 2.41 to 3.23 l/m per kW of cooling capacity is recommended in these applications.

Test individual horizontal loop circuits before backfilling. Test vertical U-bends and pond loop assemblies prior to installation. Pressures of at least 689 kPa should be used when testing. Do not exceed the pipe pressure rating. Test entire system when all loops are assembled.

Flushing the Earth Loop

Upon completion of system installation and testing, flush the system to remove all foreign objects and purge to remove all air.

Antifreeze

In areas where minimum entering loop temperatures drop below 5°C or where piping will be routed through areas subject to freezing, antifreeze is required. Alcohols and glycols are commonly used as antifreeze; however your local sales office should be consulted to determine the antifreeze best suited to your area. Freeze protection should be maintained to 9°C below the lowest expected entering loop temperature. For example, if -1°C is the minimum expected entering loop temperature, the leaving loop temperature would be -4 to -6°C and freeze protection should be at -10°C. Calculation is as follows: -1°C - 9°C = -10°C.

All alcohols should be premixed and pumped from a reservoir outside of the building when possible or introduced under the water level to prevent fumes. Calculate the total volume of fluid in the piping system. Then use the percentage by volume shown in table 2 for the amount of antifreeze needed. Antifreeze concentration should be checked from a well mixed sample using a hydrometer to measure specific gravity.

Low Water Temperature Cutout Setting

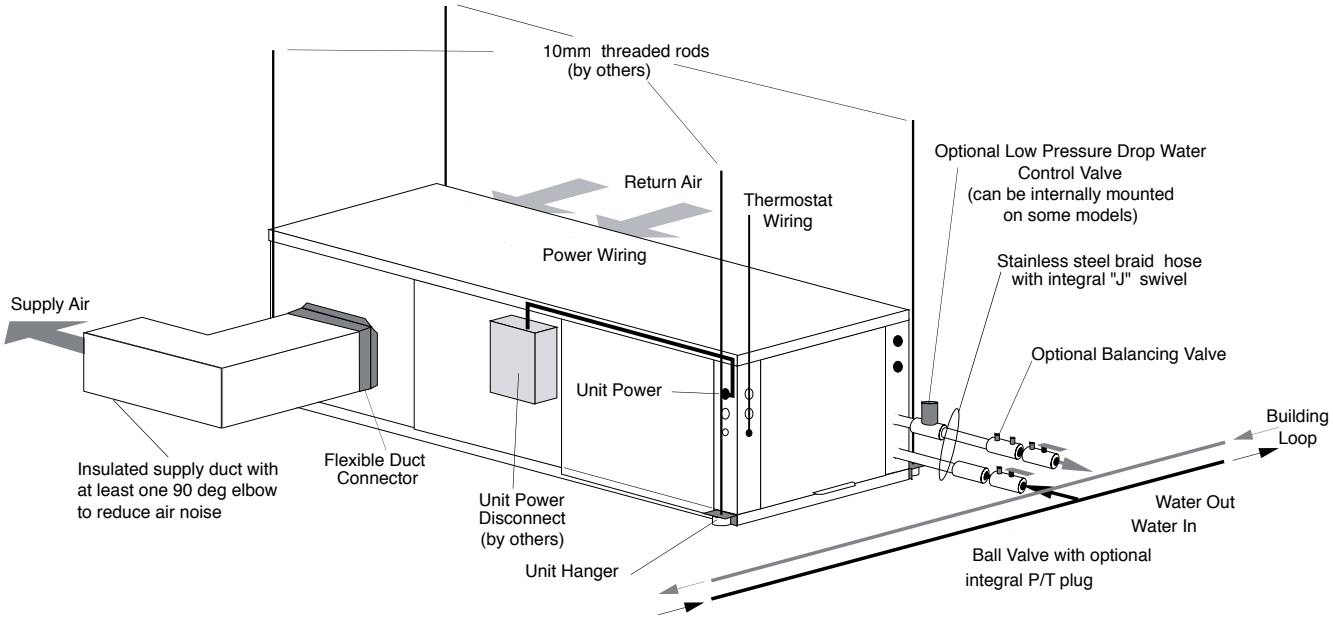
CXM - When antifreeze is selected, the FP1 jumper (JW3) should be clipped to select the low temperature (antifreeze -12.2°C) setpoint and avoid nuisance faults (see "Low Water Temperature Cutout Selection" in this manual). **Note: Low water temperature operation requires extended range equipment.**

Table 2: Antifreeze Percentages by Volume

Type	Minimum Temperature for Low Temperature Protection			
	-12.2°C	-9.4°C	-6.7°C	-3.9°C
Methanol	25%	21%	16%	10%
100% USP food grade Propylene Glycol	38%	25%	22%	15%
Ethanol*	29%	25%	20%	14%

* Must not be denatured with any petroleum based product

Figure 13: Typical Ground-Loop Application



Ground-Water Heat Pump Applications

Open Loop - Ground Water Systems
Typical open loop piping is shown in Figure 14. Shut off valves should be included for ease of servicing. Boiler drains or other valves should be "tee'd" into the lines to allow acid flushing of the heat exchanger. Shut off valves should be positioned to allow flow through the coax via the boiler drains without allowing flow into the piping system. P/T plugs should be used so that pressure drop and temperature can be measured.

⚠ WARNING! ⚠

WARNING! Polyolester Oil, commonly known as POE oil, is a synthetic oil used in many refrigeration systems including those with HFC-410A refrigerant. POE oil, if it ever comes in contact with PVC or CPVS piping, may cause failure of the PVC/CPVC. PVC/CPVC piping should never be used as supply or return water piping with water source heat pump products containing HFC-410A as system failures and property damage may result.

Water quantity should be plentiful and of good quality. Consult table 3 for water quality guidelines. The unit can be ordered with either a copper or cupro-nickel water heat exchanger. Consult Table 3 for recommendations. Copper is recommended for closed loop systems and open loop ground water systems that are not high in mineral content or corrosiveness. In conditions anticipating heavy scale formation or in brackish water, a cupro-nickel heat exchanger is recommended. In ground water situations where scaling could be heavy or where biological growth such as iron bacteria will be present, an open loop system is not recommended. Heat exchanger coils may over time lose heat exchange capabilities due to build up of mineral deposits. Heat exchangers must only be serviced by a qualified technician, as acid and special pumping equipment is required. Desuperheater coils can likewise become scaled and possibly plugged. In areas with extremely hard water, the owner should be informed that the heat exchanger may require occasional acid flushing. In some cases, the desuperheater option should not be recommended due to hard water conditions and additional maintenance required.

Water Quality Standards
Table 3 should be consulted for water quality requirements. Scaling potential should be assessed using the pH/Calcium hardness method. If the pH <7.5 and the calcium hardness is less than 100 ppm, scaling potential is low. If this method yields numbers out of range of those listed, the Ryznar Stability and Langelier Saturation indecies should be calculated. Use the appropriate scaling surface temperature for the application, 66°C for direct use (well water/open loop) and DHW (desuperheater); 32°C for indirect use. A monitoring plan should be implemented in these probable scaling situations. Other water quality issues such as iron fouling, corrosion prevention and erosion and clogging should be referenced in Table 3.

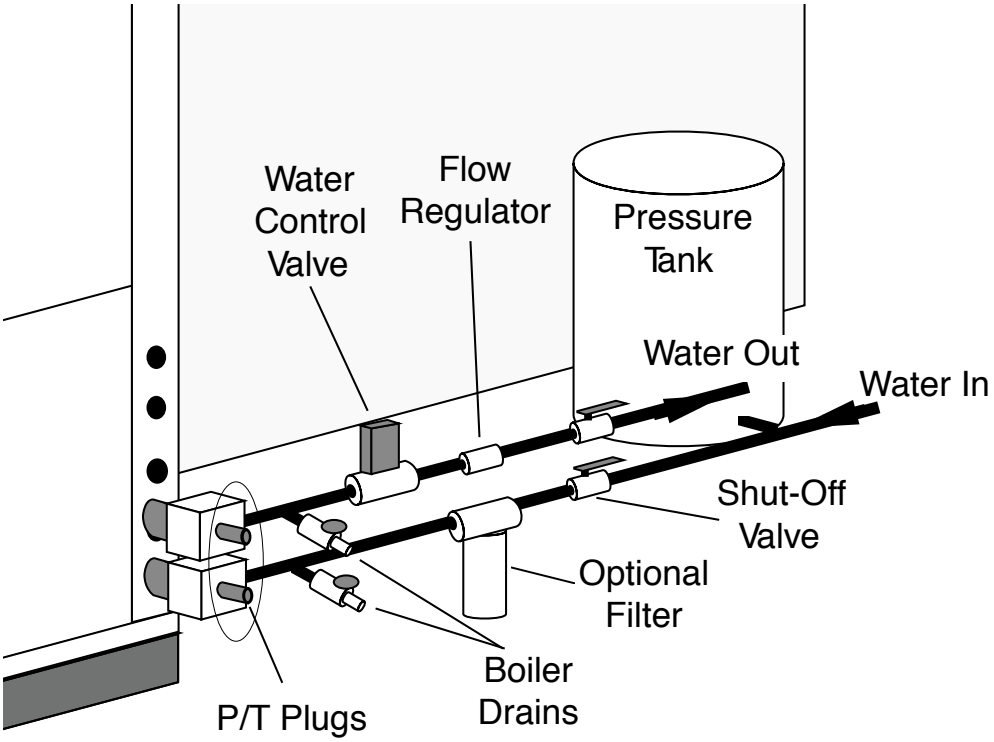
Expansion Tank and Pump
Use a closed, bladder-type expansion tank to minimize mineral formation due to air exposure. The expansion tank should be sized to provide at least one minute continuous run time of the pump using its drawdown capacity rating to prevent pump short cycling. Discharge water from the unit is not contaminated in any manner and can be disposed of in various ways, depending on local building codes (e.g. recharge well, storm sewer, drain field, adjacent stream or pond, etc.). Most local codes forbid the use of sanitary sewer for disposal. Consult your local building and zoning department to assure compliance in your area.

Water Control Valve
Note the placement of the water control valve in Figure 14. Always maintain water pressure in the heat exchanger by placing the water control valve(s) on the discharge line to prevent mineral precipitation during the off-cycle. Pilot operated slow closing valves are recommended to reduce water hammer. If water hammer persists, a mini-expansion tank can be mounted on the piping to help absorb the excess hammer shock. Ensure that the total 'VA' draw of the valve can be supplied by the unit transformer. For instance, a slow closing valve can draw up to 35VA. This can overload smaller 40 or 50 VA transformers depending on the other controls in the circuit. A typical pilot operated solenoid valve draws approximately 15VA (see Figure 21). **NOTE: the special wiring diagrams for slow closing valves (Figures 22 & 23).**

Flow Regulation
Flow regulation can be accomplished by two methods. One method of flow regulation involves simply adjusting the ball valve or water control valve on the discharge line. Measure the pressure drop through the unit heat exchanger, and determine flow rate from Tables 8a through 8e. Since the pressure is constantly varying, two pressure gauges may be needed. Adjust the valve until the desired flow of 2.0 to 2.6 l/m per kW is achieved. A second method of flow control requires a flow control device mounted on the outlet of the water control valve. The device is typically a brass fitting with an orifice of rubber or plastic material that is designed to allow a specified flow rate. On occasion, flow control devices may produce velocity noise that can be reduced by applying some back pressure from the ball valve located on the discharge line. Slightly closing the valve will spread the pressure drop over both devices, lessening the velocity noise. **NOTE: When EWT is below 10°C, 2.6 l/m per kW is required.**

Water Coil Low Temperature Limit Setting
For all open loop systems the -1.1°C FP1 setting (factory setting-water) should be used to avoid freeze damage to the unit. See "Low Water Temperature Cutout Selection" in this manual for details on the low limit setting.

Figure 14: Typical Open Loop/Well Application



Water Quality Standards

Table 3: Water Quality Standards

Water Quality Parameter	HX Material	Closed Recirculating	Open Loop and Recirculating Well		
Scaling Potential - Primary Measurement					
Above the given limits, scaling is likely to occur. Scaling indexes should be calculated using the limits below					
pH/Calcium Hardness Method	All	-	**pH < 7.5 and Ca Hardness <100ppm**		
Index Limits for Probable Scaling Situations - (Operation outside these limits is not recommended)					
Scaling indexes should be calculated at 66°C for direct use and HWG applications, and at 32°C for indirect HX use. A monitoring plan should be implemented.					
Ryznar Stability Index	All	-	**6.0 - 7.5** If >7.5 minimize steel pipe use.		
Langelier Saturation Index	All	-	**-0.5 to +0.5** If <-0.5 minimize steel pipe use. Based upon 66°C HWG and Direct well, 29°C Indirect Well HX		
Iron Fouling					
Iron Fe $^{2+}$ (Ferrous) (Bacterial Iron potential)	All	-	**<0.2 ppm (Ferrous)** If Fe^{2+} (ferrous)>0.2 ppm with pH 6 - 8, O2<5 ppm check for iron bacteria.		
Iron Fouling	All	-	**<0.5 ppm of Oxygen** Above this level deposition will occur.		
Corrosion Prevention					
pH	All	**6 - 8.5** Monitor/treat as needed	**6 - 8.5** Minimize steel pipe below 7 and no open tanks with pH <8		
Hydrogen Sulfide (H_2S)	All	-	**<0.5 ppm** At H_2S>0.2 ppm, avoid use of copper and copper nickel piping or HX's. Rotten egg smell appears at 0.5 ppm level. Copper alloy (bronze or brass) cast components are OK to <0.5 ppm.		
Ammonia ion as hydroxide, chloride, nitrate and sulfate compounds	All	-	**<0.5 ppm**		
Maximum Chloride Levels			Maximum Allowable at maximum water temperature.		
			10°C	24°C	38 °C
	Copper	-	<20ppm	NR	NR
	Cupronickel	-	<150 ppm	NR	NR
	304 SS	-	<400 ppm	<250 ppm	<150 ppm
	316 SS	-	<1000 ppm	<550 ppm	< 375 ppm
	Titanium	-	>1000 ppm	>550 ppm	>375 ppm
Erosion and Clogging					
Particulate Size and Erosion	All	<10 ppm of particles and a maximum velocity of 1.8 m/s Filtered for maximum 841 micron [0.84 mm, 20 mesh] size.	<10 ppm (<1 ppm "sandfree" for reinjection) of particles and a maximum velocity of 1.8 m/s. Filtered for maximum 841 micron 0.84 mm, 20 mesh] size. Any particulate that is not removed can potentially clog components.		

Rev.: 3/22/2012

The ClimateMaster Water Quality Table provides water quality requirements for ClimateMaster coaxial heat exchangers. When water properties are outside of those requirements, an external secondary heat exchanger must be used to isolate the heat pump heat exchanger from the unsuitable water. Failure to do so will void the warranty for the coaxial heat exchanger.

Notes:
- Closed Recirculating system is identified by a closed pressurized piping system.
- Recirculating open wells should observe the open recirculating design considerations.
- NR - Application not recommended.
- "-" No design Maximum.

Packaged Units
Revised: 02 January, 2013

Electrical - Line Voltage

Electrical - Line Voltage - All field installed wiring, including electrical ground, must comply with the National Electrical Code as well as all applicable local codes. Refer to the unit electrical data for fuse sizes. Consult wiring diagram for field connections that must be made by the installing (or electrical) contractor. All final electrical connections must be made with a length of flexible conduit to minimize vibration and sound transmission to the building.

General Line Voltage Wiring - Be sure the available power is the same voltage and phase shown on the unit serial plate. Line and low voltage wiring must be done in accordance with local codes or the National Electric Code, whichever is applicable.

Transformer
On dual voltage units the installer must confirm that the power supply and unit transformer wiring match. Installer must rewire as needed. Refer to the unit wiring diagram for proper connections.

⚠ WARNING! ⚠

WARNING! To avoid possible injury or death due to electrical shock, open the power supply disconnect switch and secure it in an open position during installation.

⚠ CAUTION! ⚠

CAUTION! Use only copper conductors for field installed electrical wiring. Unit terminals are not designed to accept other types of conductors.

Table 4l: Tranquility® 20 (TS) Series Electrical Data - (Standard 50Hz Units)

Model	Voltage Code	Rated Voltage	Min/Max	Compressor					Fan Motor FLA	Total Unit FLA	Min Circuit Amp	Max Fuse
				MCC	RLA	RLA	LRA	Qty				
TSH/V 009	T	220-240/50/1	197/254	16.0	10.3	3.2	17.0	1	0.3	3.5	4.3	15
TSH/V 012	T	220-240/50/1	197/254	26.0	16.7	4.0	19.0	1	0.7	4.7	5.7	15
TSH/V/D 018	T	220-240/50/1	197/254	16.0	10.3	7.1	44.0	1	0.9	8.0	9.8	15
TSH/V/D 024	T	220-240/50/1	197/254	16.0	10.3	10.9	58.0	1	0.9	11.8	14.5	25
	S	380-420/50/3	342/462	16.0	10.3	4.0	24.0	1	0.6	4.6	5.6	15
TSH/V/D 030	T	220-240/50/1	197/254	26.0	16.7	10.9	58.0	1	1.6	12.5	15.2	25
	S	380-420/50/3	342/462	26.0	16.7	4.5	26.0	1	0.9	5.4	6.5	15
TSH/V/D 036	T	220-240/50/1	197/254	16.0	10.3	12.5	61.0	1	2.0	14.5	17.6	30
	S	380-420/50/3	342/462	16.0	10.3	4.5	32.0	1	1.2	5.7	6.8	15
TSH/V/D 042	S	380-420/50/3	342/462	16.0	10.3	5.1	35.0	1	1.0	6.1	7.4	15
TSH/V/D 048	S	380-420/50/3	342/462	26.0	16.7	7.1	48.0	1	1.7	8.8	10.6	15
TSH/V/D 060	S	380-420/50/3	342/462	16.0	10.3	9.6	64.0	1	2.5	12.1	14.5	20
TSH/V/D 070	S	380-420/50/3	342/462	26.0	16.7	9.6	74.0	1	2.6	12.2	14.6	20

Table 4k: Tranquility® 16 (TC) Series Electrical Data - (Standard 50Hz Units)

TC Model	Voltage Code	Rated Voltage	Voltage Min/Max	Compressor			Fan Motor FLA	Total Unit FLA	Min Circuit Amp	Max Fuse
				QTY	RLA	LRA				
006	V	220/240-50-1	209/252	1	2.8	15.0	0.4	3.2	3.9	15
009	V	220/240-50-1	209/252	1	3.1	18.8	0.7	3.8	4.6	15
012	V	220/240-5-1	209/252	1	4.0	21.0	0.7	4.7	5.7	15
015	V	220/240-50-1	209/252	1	4.7	23.0	0.9	5.6	6.7	15
018	V	220/240-50-1	209/252	1	5.9	24.0	0.9	6.8	8.2	15
024	V	220/240-50-1	209/252	1	9.0	52.0	1.3	10.3	12.6	20
030	V	220/240-50-1	209/252	1	11.2	60.0	2.7	13.9	16.7	25
	U	380/415-50-3	361/436	1	3.9	28.0	1.7	5.6	6.6	15
036	V	220/240-50-1	209/252	1	13.5	67.0	2.0	15.5	18.9	30
	U	380/415-50-3	361/436	1	5.4	38.0	1.2	6.6	8.0	15
042	U	380/415-50-3	361/436	1	6.0	46.0	1.7	7.7	9.2	15
048	U	380/415-50-3	361/436	1	6.1	43.0	1.8	7.9	9.4	15
060	U	380/415-50-3	361/436	1	7.8	51.5	2.5	10.3	12.3	20

All fuses Class RK-5

Electrical - Power Wiring

⚠ WARNING! ⚠

WARNING! Disconnect electrical power source to prevent injury or death from electrical shock.

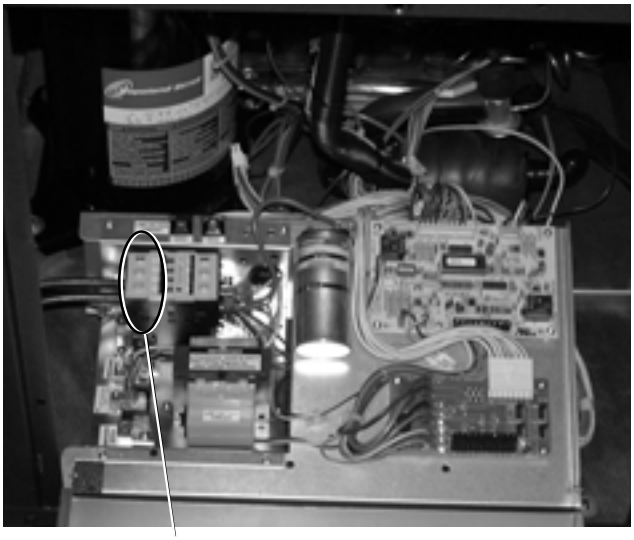
⚠ CAUTION! ⚠

CAUTION! Use only copper conductors for field installed electrical wiring. Unit terminals are not designed to accept other types of conductors.

Electrical - Line Voltage - All field installed wiring, including electrical ground, must comply with the National Electrical Code as well as all applicable local codes. Refer to the unit electrical data for fuse sizes. Consult wiring diagram for field connections that must be made by the installing (or electrical) contractor. All final electrical connections must be made with a length of flexible conduit to minimize vibration and sound transmission to the building.

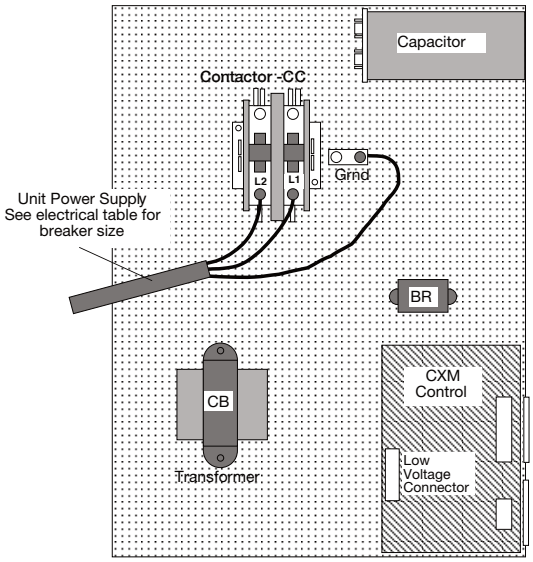
General Line Voltage Wiring - Be sure the available power is the same voltage and phase shown on the unit serial plate. Line and low voltage wiring must be done in accordance with local codes or the National Electric Code, whichever is applicable.

Figure 15: TS Single Phase Line Voltage Field Wiring. Three phase wiring is similar except that all three power wires are directly connected to the contactor.



Unit Power Supply
(Field wiring will be made to the service disconnect on units that include that option.)

Figure 16: TC Single Phase Line Voltage Field Wiring. Three phase wiring is similar except that all three power wires are directly connected to the contactor.



Power Connection
Line voltage connection is made by connecting the incoming line voltage wires to the "L" side of the contactor as shown in Figures 15 and 16. Consult electrical tables for correct fuse size.

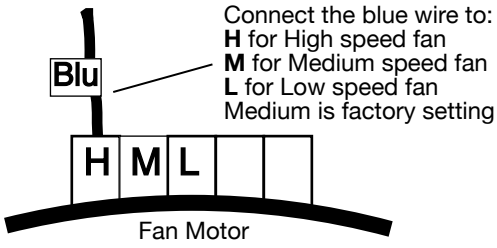
Transformer
On dual voltage units the installer must confirm that the power supply and unit transformer wiring match. Installer must rewire as needed. Refer to the unit wiring diagram for proper connections.

Blower Speed Selection – Units with PSC Motor
PSC (Permanent Split Capacitor) blower fan speed can be changed by moving the blue wire on the fan motor terminal block to the desired speed as shown in Figure 17. Most ClimateMaster units are shipped on the medium speed tap. Consult submittal data or engineering design guide for specific unit airflow tables. Typical unit design delivers rated airflow at nominal static 37Pa on medium speed and rated airflow at a higher static 100 to 125 Pa on high speed for applications where higher static is required. Low speed will deliver approximately 85% of rated airflow at 25 Pa. An optional high static blower is available on some models.

Electrical - Power & Low Voltage Wiring

Special Note for AHRI Testing: To achieve rated airflow for AHRI testing purposes on all PSC products, it is necessary to change the fan speed to "HI" speed. When the heat pump has experienced less than 100 operational hours and the coil has not had sufficient time to be "seasoned", it is necessary to clean the coil with a mild surfactant such as Calgon to remove the oils left by manufacturing processes and enable the condensate to properly "sheet" off of the coil.

Figure 17: PSC Motor Speed Selection



ELECTRICAL - LOW VOLTAGE WIRING

Thermostat Connections
The thermostat should be wired directly to the CXM or DXM board. Figure 19 shows low voltage wiring. See "Electrical – Thermostat" for specific terminal connections. Review the appropriate AOM (Application, Operation and Maintenance) manual for units with DDC controls.

Low Water Temperature Cutout Selection
The CXM/DXM control allows the field selection of low water (or water-antifreeze solution) temperature limit by clipping jumper JW3, which changes the sensing temperature associated with thermistor FP1. Note that the FP1 thermistor is located on the refrigerant line between the coaxial heat exchanger and expansion device (TXV or cap tube). Therefore, FP1 is sensing refrigerant temperature, not water temperature, which is a better indication of how water flow rate/temperature is affecting the refrigeration circuit.

The factory setting for FP1 is for systems using water -1.1°C refrigerant temperature). In low water temperature (extended range) applications with antifreeze (most ground loops), jumper JW3 should be clipped as shown in Figure 20 to change the setting to -12.2°C refrigerant temperature, a more suitable temperature when using an antifreeze solution. All ClimateMaster units operating with entering water temperatures below 15°C must include the optional water/refrigerant circuit insulation package to prevent internal condensation.

Figure 19: Low Voltage Field Wiring

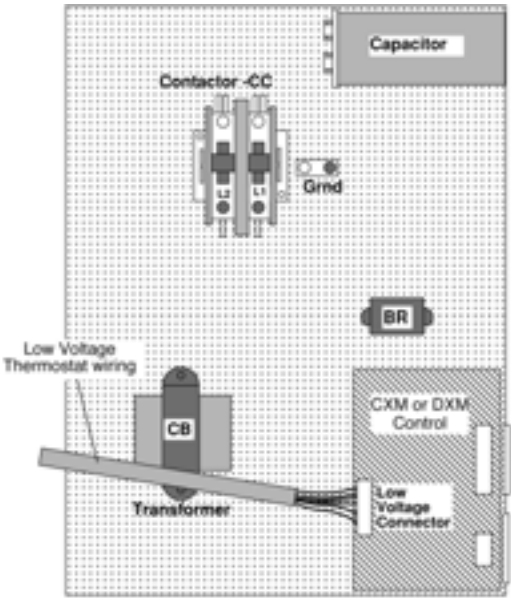
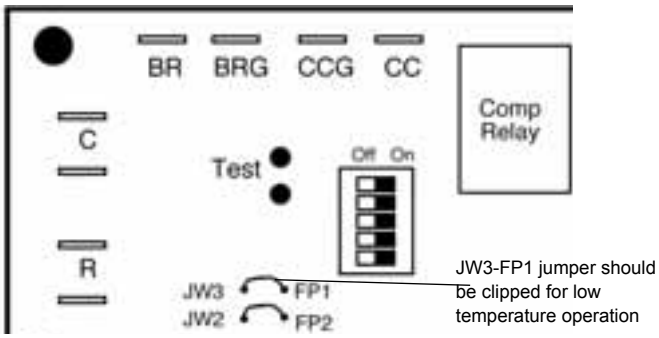


Figure 20: FP1 Limit Setting



CXM PCB

Accessory Connections

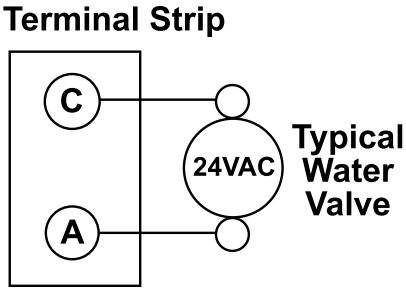
A terminal paralleling the compressor contactor coil has been provided on the CXM/DXM control. Terminal "A" is designed to control accessory devices, such as water valves. Note: This terminal should be used only with 24 Volt signals and not line voltage. Terminal "A" is energized with the compressor contactor. See Figure 19 or the specific unit wiring diagram for details.

Low Voltage VA Ratings

Component	VA
Typical Blower Relay	6 - 7
Typical Reversing Valve Solenoid	4 - 6
30A Compressor Contactor	6 - 9
Subtotal	**16 - 22**
+ CXM board (5 - 9 VA)*	21 - 31
Remaing VA for Accessories	19 - 29
+ DXM board (8 - 12 VA)*	24 - 34
Remaing VA for Accessories	41 - 51

*Standard transformer for CXM board is 50VA.
Optional DXM board and/or DDC controls include 75VA transformer.

Figure 21: Accessory Wiring



Water Solenoid Valves - An external solenoid valve(s) should be used on ground water installations to shut off flow to the unit when the compressor is not operating. A slow closing valve may be required to help reduce water hammer. Figure 19 shows typical wiring for a 24VAC external solenoid valve. Figures 20 and 21 illustrate typical slow closing water control valve wiring for Taco 500 series (ClimateMaster P/N AVM) and Taco SBV series valves. Slow closing valves take approximately 60 seconds to open (very little water will flow before 45 seconds). Once fully open, an end switch allows the compressor to be energized. Only relay or triac based electronic thermostats should be used with slow closing valves. When wired as shown, the slow closing valve will operate properly with the following notations:

1. The valve will remain open during a unit lockout.
2. The valve will draw approximately 25-35 VA through the "Y" signal of the thermostat.

Note: This valve can overheat the anticipator of an electromechanical thermostat. Therefore, only relay or triac based thermostats should be used.

Figure 22: AMV Valve Wiring

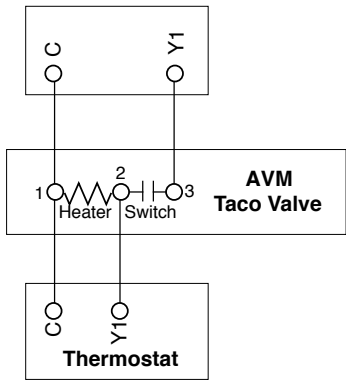
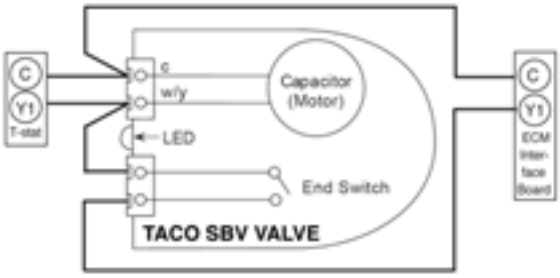


Figure 23: Taco SBV Valve Wiring

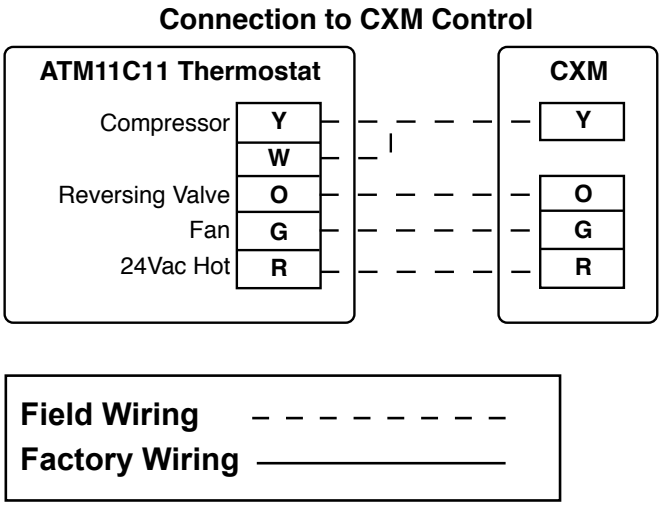


ELECTRICAL - THERMOSTAT WIRING

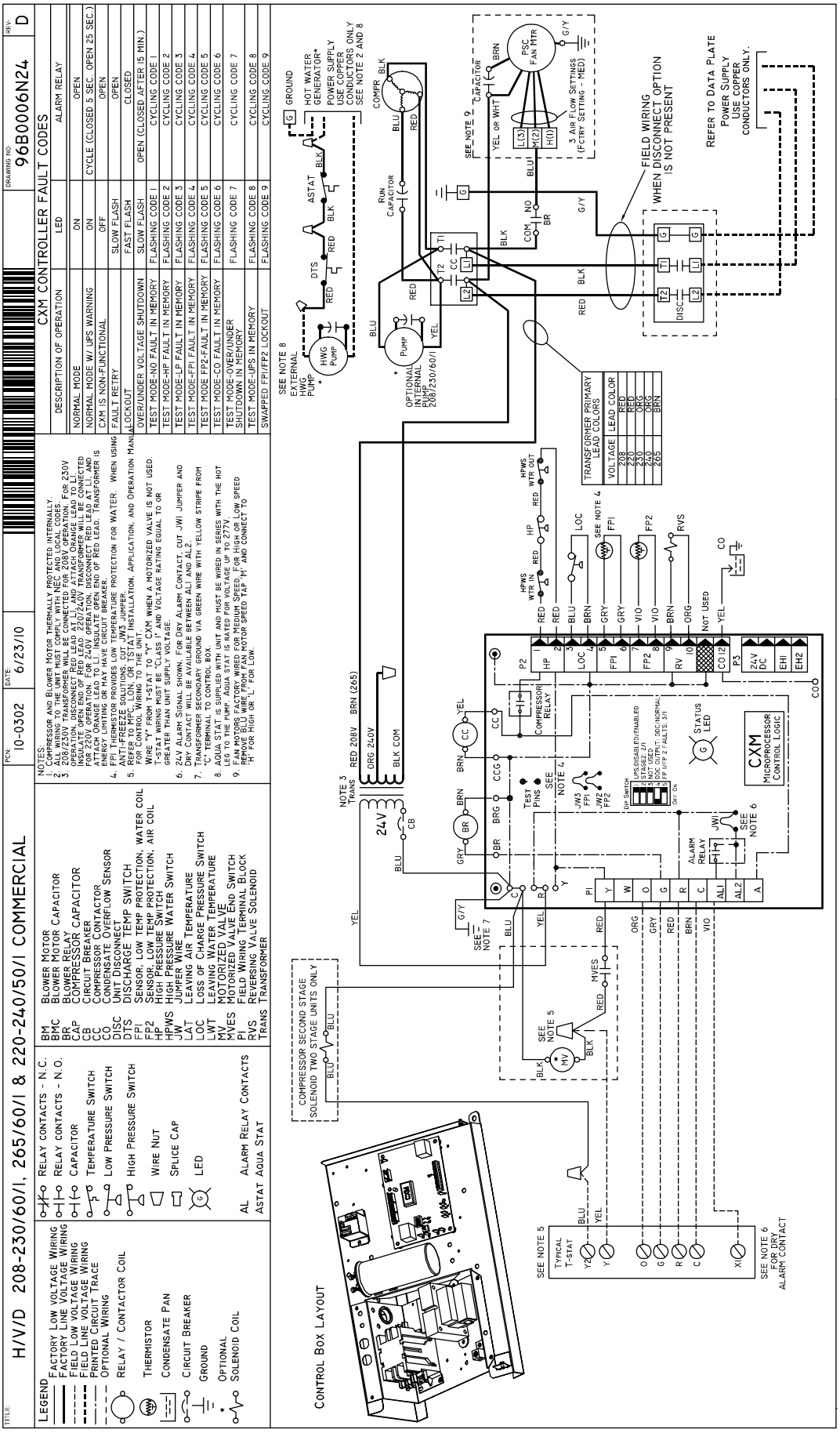
Thermostat Installation

The thermostat should be located on an interior wall in a larger room, away from supply duct drafts. DO NOT locate the thermostat in areas subject to sunlight, drafts or on external walls. The wire access hole behind the thermostat may in certain cases need to be sealed to prevent erroneous temperature measurement. Position the thermostat back plate against the wall so that it appears level and so the thermostat wires protrude through the middle of the back plate. Mark the position of the back plate mounting holes and drill holes with a 3/16" (5mm) bit. Install supplied anchors and secure plate to the wall. Thermostat wire must be 18 AWG wire. Wire the appropriate thermostat as shown in Figure 25a to the low voltage terminal strip on the CXM or DXM control board. Practically any heat pump thermostat will work with ClimateMaster units, provided it has the correct number of heating and cooling stages.

Figure 25a: Units With PSC Fan And CXM



Typical Wiring Diagram - TS Units with CXM Board and PSC Fan Motor (Single Phase)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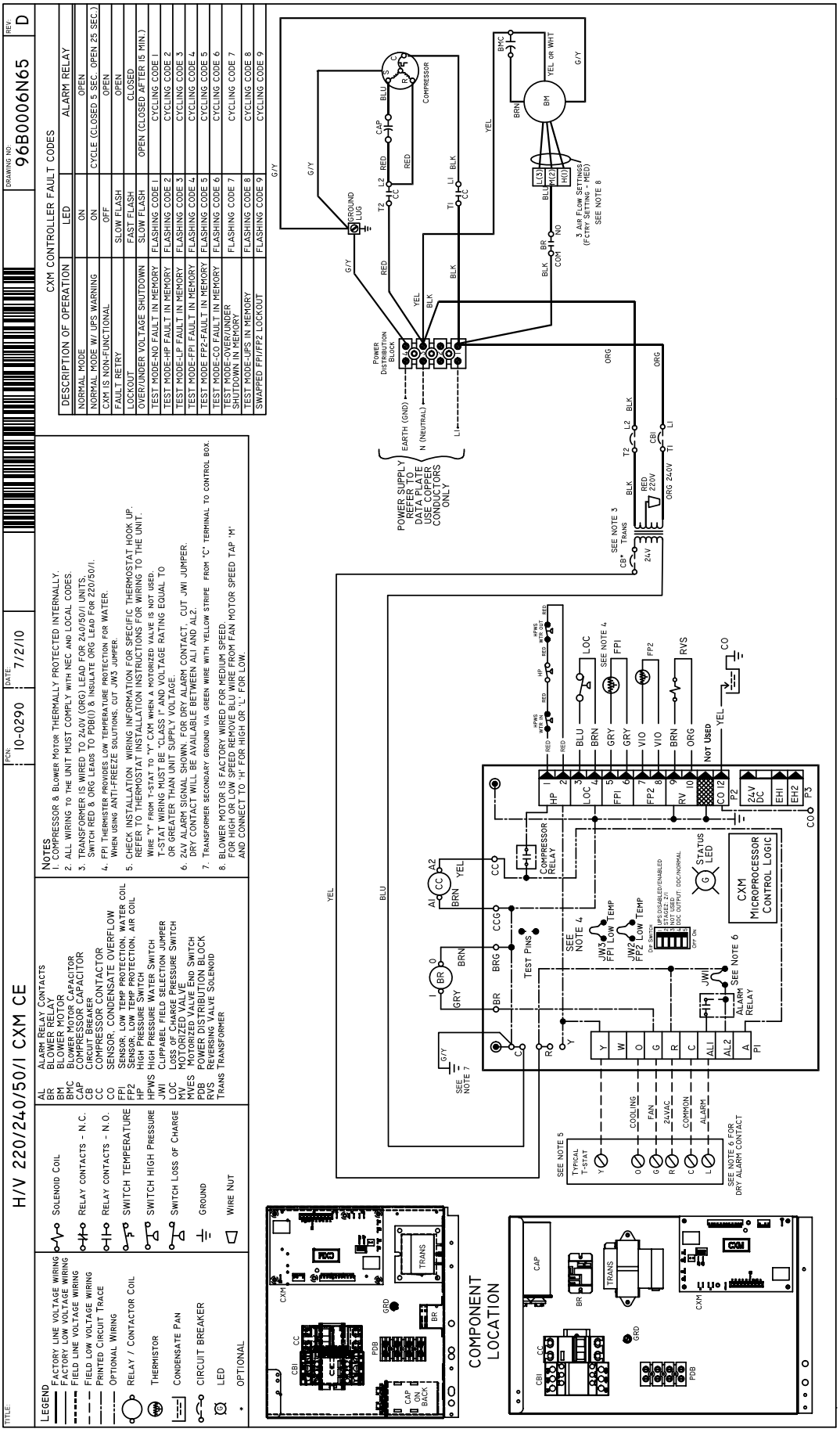
PCN: 10-0302
DATE: 6/23/10
DRAWING NO: 96B0006N24
REV: D
LEGEND
FACTORY LOW VOLTAGE WIRING
FACTORY LINE VOLTAGE WIRING
FIELD LOW VOLTAGE WIRING
FIELD LINE VOLTAGE WIRING
PRINTED CIRCUIT TRACE
OPTIONAL WIRING
RELAY / CONTACTOR COIL
THERMISTOR
CONDENSATE PAN
CIRCUIT BREAKER
GROUND
OPTIONAL
SOLENOID COIL
RELAY CONTACTS - N.C.
RELAY CONTACTS - N.O.
CAPACITOR
TEMPERATURE SWITCH
LOW PRESSURE SWITCH
HIGH PRESSURE SWITCH
WIRE NUT
SPLICE CAP
LED
ALARM RELAY CONTACTS
AQUA STAT
BM BLOWER MOTOR
BMC BLOWER MOTOR CAPACITOR
BR BLOWER RELAY
CAP COMPRESSOR CAPACITOR
CB CIRCUIT BREAKER
CC COMPRESSOR CONTACTOR
COND CONDENSATE OVERFLOW SENSOR
DISC UNIT DISCONNECT SWITCH
DTS DISCHARGE TEMP SWITCH
FP1 SENSOR, LOW TEMP PROTECTION, WATER COIL
FP2 SENSOR, LOW TEMP PROTECTION, AIR COIL
HP HIGH PRESSURE SWITCH
HPWS HIGH PRESSURE WATER SWITCH
JW JUMPER WIRE
LAT LEAVING AIR TEMPERATURE
LOC LOSS OF CHARGE PRESSURE SWITCH
LWT LEAVING WATER TEMPERATURE
MV MOTORIZED VALVE
MVES MOTORIZED VALVE END SWITCH
PI FIELD WIRING TERMINAL BLOCK
RVS REVERSING VALVE SOLENOID
TRANS TRANSFORMER
NOTES:
1. COMPRESSOR AND BLOWER MOTOR THERMALLY PROTECTED INTERNALLY.
2. ALL WIRING TO THE UNIT MUST COMPLY WITH NEC AND LOCAL CODES.
3. 208/230V TRANSFORMER WILL BE CONNECTED FOR 208V OPERATION. FOR 230V OPERATION, DISCONNECT ORG LEAD AT T1, AND INSULATE. FOR 265V OPERATION, DISCONNECT RED LEAD AT L1, AND INSULATE. OPEN END OF RED LEAD. 220/240V TRANSFORMER WILL BE CONNECTED FOR 220V OPERATION. FOR 240V OPERATION, DISCONNECT RED LEAD AT L1, AND INSULATE. OPEN END OF RED LEAD. TRANSFORMER IS ENERGY LIMITING OR MAY HAVE CIRCUIT BREAKER.
4. FP1 THERMISTOR PROVIDES LOW TEMPERATURE PROTECTION FOR WATER. WHEN USING ANTI-FREEZE SOLUTIONS, CUT JW3 JUMPER.
5. REFER TO MPC LON, OR TSTAT INSTALLATION, APPLICATION, AND OPERATION MANUALS FOR CONTROL WIRING TO TSTAT.
6. 24V ALARM SIGNAL SHOWN. FOR DRY ALARM CONTACT, CUT JW1 JUMPER AND WIRE "Y" FROM T-STAT TO "Y" CXM WHEN A MOTORIZED VALVE IS NOT USED. T-STAT WIRING MUST BE "CLASS 1" AND VOLTAGE RATING EQUAL TO OR GREATER THAN UNIT SUPPLY VOLTAGE.
7. TRANSFORMER SECONDARY GROUND VIA GREEN WIRE WITH YELLOW STRIPE FROM "C" TERMINAL TO CONTROL BOX.
8. AQUA STAT IS SUPPLIED WITH UNIT AND MUST BE WIRED IN SERIES WITH THE HOT WATER GENERATOR PUMP AND ALSO WITH THE FP2 SENSOR.
9. FAN MOTORS FACTORY WIRED FOR MEDIUM SPEED. FOR HIGH OR LOW SPEED REMOVE BLU WIRE FROM FAN MOTOR SPEED TAP "M" AND CONNECT TO "H" FOR HIGH OR "L" FOR LOW.
CXM CONTROLLER FAULT CODES
DESCRIPTION OF OPERATION | LED | ALARM RELAY
NORMAL MODE | ON | OPEN
NORMAL MODE W/ UPS WARNING | ON | CYCLE (CLOSED 5 SEC. OPEN 25 SEC.)
CXM IS NON-FUNCTIONAL | OFF | OPEN
FAULT RETRY | SLOW FLASH | OPEN
LOCKOUT | FAST FLASH | CLOSED
OVER/UNDER VOLTAGE SHUTDOWN | SLOW FLASH | OPEN (CLOSED AFTER 15 MIN.)
TEST MODE-NO FAULT IN MEMORY | FLASHING CODE 1 | CYCLING CODE 1
TEST MODE-HP FAULT IN MEMORY | FLASHING CODE 2 | CYCLING CODE 2
TEST MODE-LP FAULT IN MEMORY | FLASHING CODE 3 | CYCLING CODE 3
TEST MODE-FP1 FAULT IN MEMORY | FLASHING CODE 4 | CYCLING CODE 4
TEST MODE FP2-FAULT IN MEMORY | FLASHING CODE 5 | CYCLING CODE 5
TEST MODE-CO FAULT IN MEMORY | FLASHING CODE 6 | CYCLING CODE 6
TEST MODE-OVER/UNDER SHUTDOWN IN MEMORY | FLASHING CODE 7 | CYCLING CODE 7
TEST MODE-UPS IN MEMORY | FLASHING CODE 8 | CYCLING CODE 8
SWAPPED FP1/FP2 LOCKOUT | FLASHING CODE 9 | CYCLING CODE 9
CONTROL BOX LAYOUT
CXM MICROPROCESSOR CONTROL LOGIC
TRANSFORMER PRIMARY LEAD COLORS
VOLTAGE | LEAD COLOR
208 RED
230 RED
230 ORG
240 ORG
265 BRN
WHEN DISCONNECT OPTION IS NOT PRESENT
REFER TO DATA PLATE POWER SUPPLY USE COPPER CONDUCTORS ONLY.
SEE NOTE 8 EXTERNAL HWG PUMP
HOT WATER GENERATOR* POWER SUPPLY USE COPPER CONDUCTORS ONLY SEE NOTE 2 AND 8
OPTIONAL INTERNAL HWG PUMP 208/230/60/1
PSC FAN MTR
3 AIR FLOW SETTINGS (FCTRY SETTING - MED)
SEE NOTE 9 CAPACITOR
RUN CAPACITOR
COMPR
COMPRESSOR RELAY
COMPRESSOR SECOND STAGE SOLENOID TWO STAGE UNITS ONLY
NOTE 3 TRANS
SEE NOTE 4
SEE NOTE 5
SEE NOTE 6
SEE NOTE 7
TYPICAL T-STAT
SEE NOTE 5 FOR DRY ALARM CONTACT
SEE NOTE 6
DIP Switch
UPS DISABLED/ENABLED
SOFT 2-STAGE
DOC OUTPUT: DOC/NORMAL
FP1/FP2 FAULTS: 3/1
STATUS LED
ALARM RELAY
2A V DC
EH1
EH2
NOT USED
HPWS WTR IN
HPWS WTR OUT
FP1
FP2
RVS
LOC
HP
CO
P1
P2
P3

Packaged Units
Revised: 02 January, 2013

Typical Wiring Diagram - Single Phase 50 Hz TC Units with CXM Controller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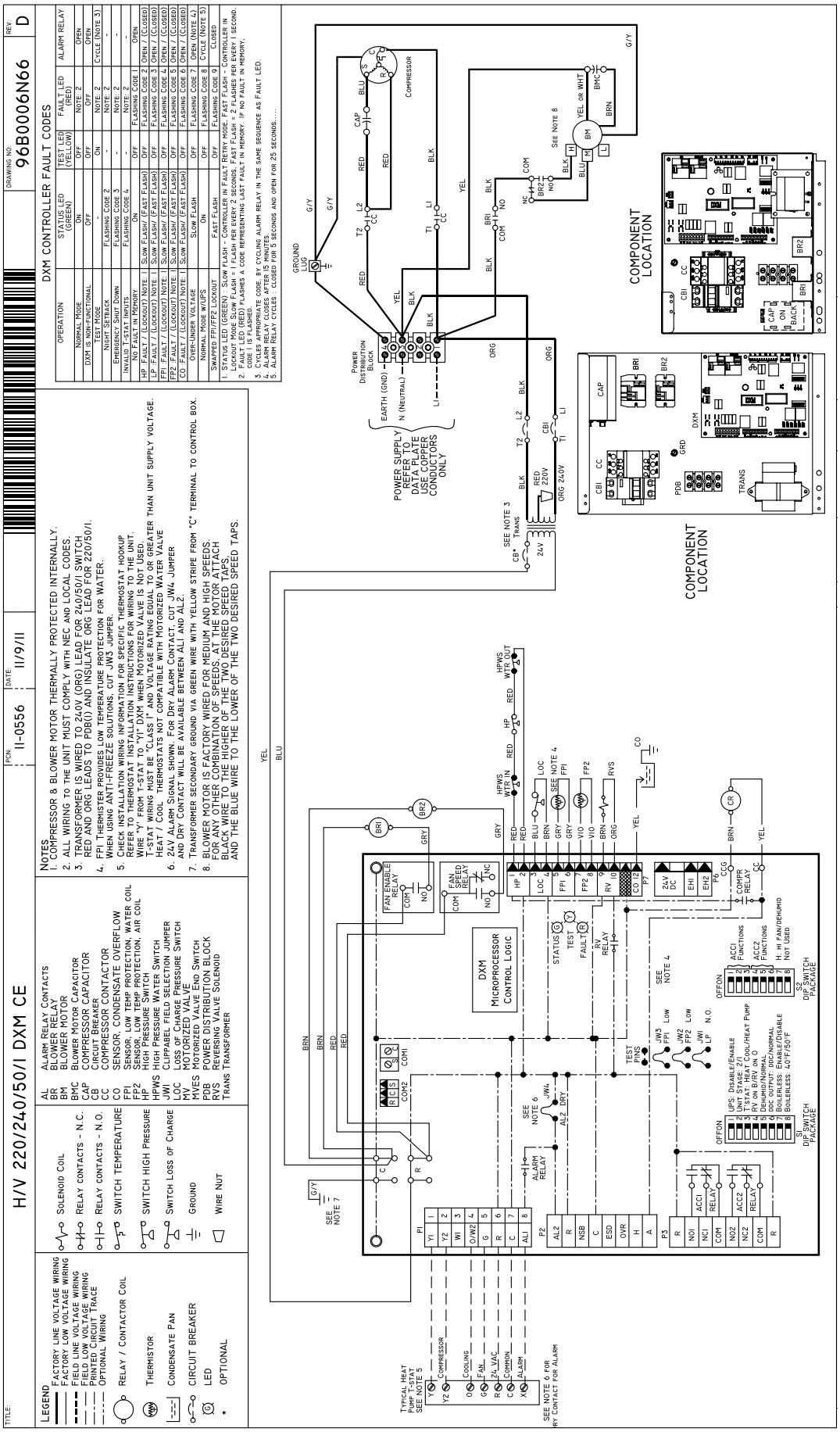
REV: D
LEGEND
FACTORY LINE VOLTAGE WIRING
FACTORY LOW VOLTAGE WIRING
FIELD LINE VOLTAGE WIRING
FIELD LOW VOLTAGE WIRING
PRINTED CIRCUIT TRACE
OPTIONAL WIRING
RELAY / CONTACTOR COIL
THERMISTOR
CONDENSATE PAN
CIRCUIT BREAKER
LED
OPTIONAL
SOLENOID COIL
RELAY CONTACTS - N.C.
RELAY CONTACTS - N.O.
SWITCH TEMPERATURE
SWITCH HIGH PRESSURE
SWITCH LOSS OF CHARGE
GROUND
WIRE NUT
AL ALARM RELAY CONTACTS
BR BLOWER RELAY
BM BLOWER MOTOR
BMC BLOWER MOTOR CAPACITOR
CAP COMPRESSOR CAPACITOR
CB CIRCUIT BREAKER
CC COMPRESSOR CONTACTOR
CO SENSOR, CONDENSATE OVERFLOW
FPI SENSOR, LOW TEMP PROTECTION, WATER COIL
FP2 SENSOR, LOW TEMP PROTECTION, AIR COIL
HP HIGH PRESSURE SWITCH
HPWS HIGH PRESSURE WATER SWITCH
JWI CLIPPABEL FIELD SELECTION JUMPER
LOC LOSS OF CHARGE PRESSURE SWITCH
MV MOTORIZED VALVE
MVES MOTORIZED VALVE END SWITCH
PDB POWER DISTRIBUTION BLOCK
RVS REVERSING VALVE SOLENOID
TRANS TRANSFORMER
NOTES
1. COMPRESSOR & BLOWER MOTOR THERMALLY PROTECTED INTERNALLY.
2. ALL WIRING TO THE UNIT MUST COMPLY WITH NEC AND LOCAL CODES.
3. TRANSFORMER IS WIRED TO 240V (ORG) LEAD FOR 240/50/1 UNITS. SWITCH RED & ORG LEADS TO PDB(1) & INSULATE ORG LEAD FOR 220/50/1.
4. FPI THERMISTER PROVIDES LOW TEMPERATURE PROTECTION FOR WATER. WHEN USING ANTI-FREEZE SOLUTIONS, CUT JW3 JUMPER.
5. CHECK INSTALLATION WIRING INFORMATION FOR SPECIFIC THERMOSTAT HOOK UP. REFER TO THERMOSTAT INSTALLATION INSTRUCTIONS FOR WIRING TO THE UNIT. WIRE "Y" FROM T-STAT TO "Y" CXM WHEN A MOTORIZED VALVE IS NOT USED. T-STAT WIRING MUST BE "CLASS I" AND VOLTAGE RATING EQUAL TO OR GREATER THAN UNIT SUPPLY VOLTAGE.
6. 24V ALARM SIGNAL SHOWN. FOR DRY ALARM CONTACT, CUT JWI JUMPER. DRY CONTACT WILL BE AVAILABLE BETWEEN ALI AND AL2.
7. TRANSFORMER SECONDARY GROUND VIA GREEN WIRE WITH YELLOW STRIPE FROM "C" TERMINAL TO CONTROL BOX.
8. BLOWER MOTOR IS FACTORY WIRED FOR MEDIUM SPEED. FOR HIGH OR LOW SPEED, REMOVE BLUE WIRE FROM FAN MOTOR SPEED TAP 'M' AND CONNECT TO 'H' FOR HIGH OR 'L' FOR LOW.
CXM CONTROLLER FAULT CODES
DESCRIPTION OF OPERATION | LED | ALARM RELAY
NORMAL MODE | ON | OPEN
NORMAL MODE W/ UPS WARNING | ON | CYCLE (CLOSED 5 SEC. OPEN 25 SEC.)
CXM IS NON-FUNCTIONAL | OFF | OPEN
FAULT RETRY | SLOW FLASH | OPEN
LOCKOUT | FAST FLASH | CLOSED
OVER/UNDER VOLTAGE SHUTDOWN | SLOW FLASH | OPEN (CLOSED AFTER 15 MIN.)
TEST MODE-NO FAULT IN MEMORY | FLASHING CODE 1 | CYCLING CODE 1
TEST MODE-HP FAULT IN MEMORY | FLASHING CODE 2 | CYCLING CODE 2
TEST MODE-LP FAULT IN MEMORY | FLASHING CODE 3 | CYCLING CODE 3
TEST MODE-FPI FAULT IN MEMORY | FLASHING CODE 4 | CYCLING CODE 4
TEST MODE FP2-FAULT IN MEMORY | FLASHING CODE 5 | CYCLING CODE 5
TEST MODE-CO FAULT IN MEMORY | FLASHING CODE 6 | CYCLING CODE 6
TEST MODE-OVER/UNDER SHUTDOWN IN MEMORY | FLASHING CODE 7 | CYCLING CODE 7
TEST MODE-UPS IN MEMORY | FLASHING CODE 8 | CYCLING CODE 8
SWAPPED FPI/FP2 LOCKOUT | FLASHING CODE 9 | CYCLING CODE 9
POWER SUPPLY REFER TO DATA PLATE USE COPPER CONDUCTORS ONLY
EARTH (GND)
N (NEUTRAL)
L1
POWER DISTRIBUTION BLOCK
GROUND LUG
COMPRESSOR
CAP
BMC
BM
YEL OR WHT
3 AIR FLOW SETTINGS (FCTRY SETTING - MED) SEE NOTE 8
SEE NOTE 3
CB* TRANS
24V
RED 220V
ORG 240V
CBI
HPWS
HP
LOC
FPI
FP2
RVS
CO
NOT USED
SEE NOTE 4
COMPRESSOR RELAY
JW3 FPI LOW TEMP
JW2 FP2 LOW TEMP
JWI
SEE NOTE 6
ALARM RELAY
STATUS LED
CXM MICROPROCESSOR CONTROL LOGIC
TEST PINS
SEE NOTE 7
SEE NOTE 5
TYPICAL T-STAT
COOLING
FAN
24VAC
COMMON
ALARM
SEE NOTE 6 FOR DRY ALARM CONTACT
COMPONENT LOCATION
CXM
TRANS
CAP
PDB
GRD
CC
CBI
FUSE
LINE VOLTAGE BACK

Typical Wiring Diagram - Single Phase 50 Hz TC Units with DXM Controller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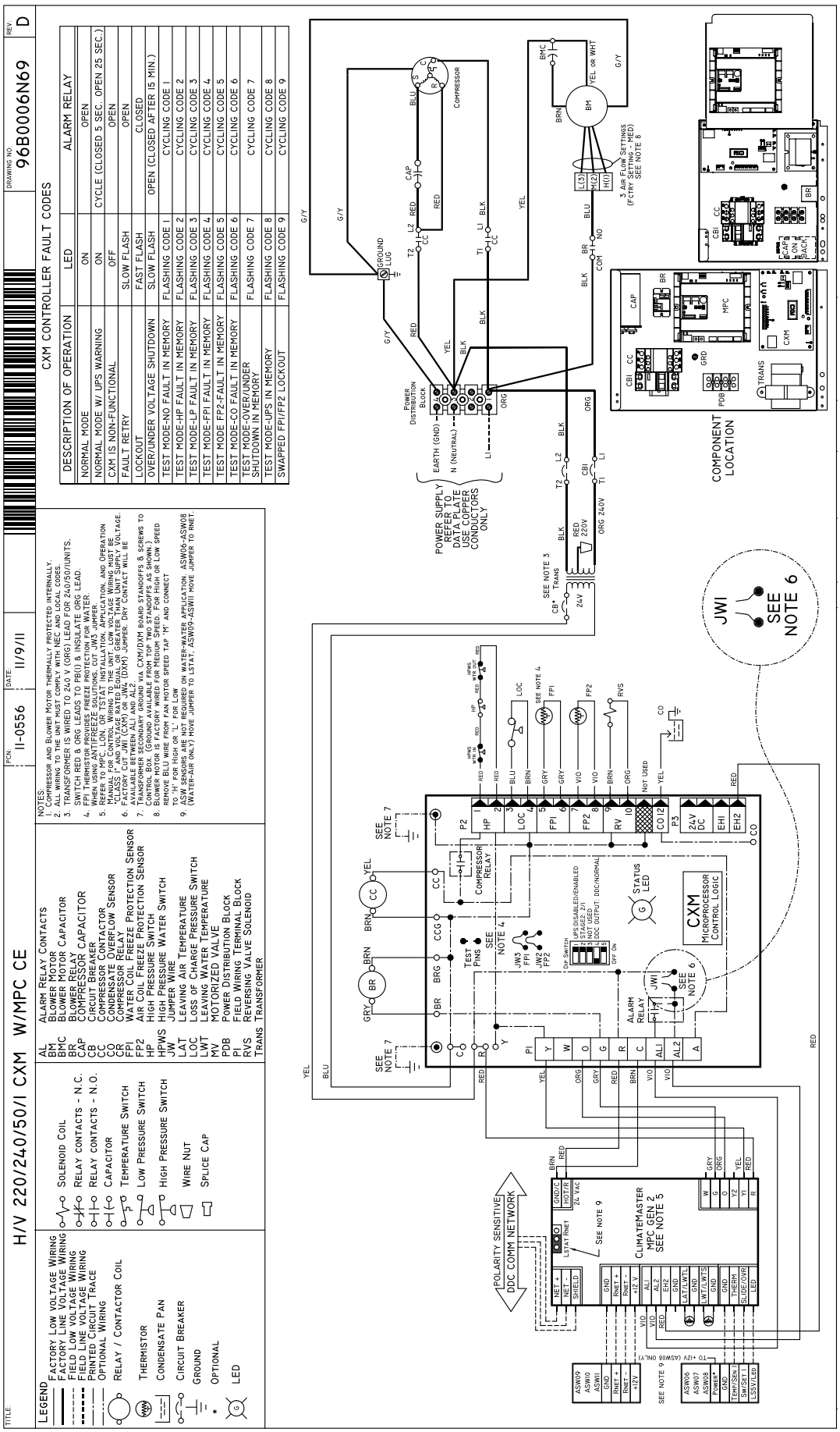
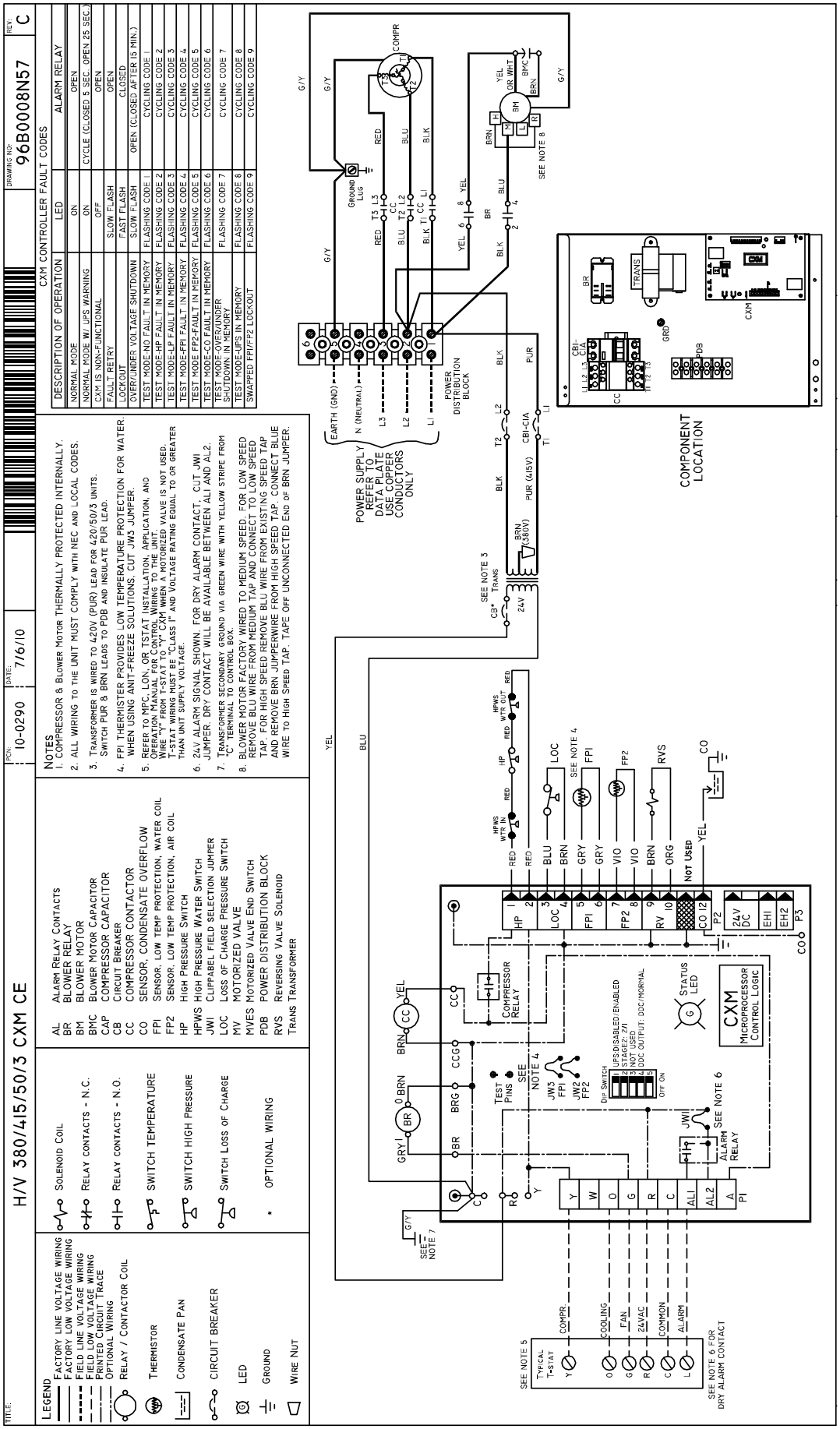
FACTORY LOW VOLTAGE WIRING
FIELD LINE VOLTAGE WIRING
FIELD LOW VOLTAGE WIRING
PRINTED CIRCUIT TRACE
OPTIONAL WIRING
RELAY / CONTACTOR COIL
THERMISTOR
CONDENSATE PAN
CIRCUIT BREAKER
LED
* OPTIONAL
SOLENOID COIL
RELAY CONTACTS - N.C.
RELAY CONTACTS - N.O.
SWITCH TEMPERATURE
SWITCH HIGH PRESSURE
SWITCH LOSS OF CHARGE
GROUND
WIRE NUT
AL ALARM RELAY CONTACTS
BR BLOWER RELAY
BM BLOWER MOTOR
BMC BLOWER MOTOR CAPACITOR
CAP COMPRESSOR CAPACITOR
CB CIRCUIT BREAKER
CC COMPRESSOR CONTACTOR
CO SENSOR, CONDENSATE OVERFLOW
FPI SENSOR, LOW TEMP PROTECTION, WATER COIL
FP2 SENSOR, LOW TEMP PROTECTION, AIR COIL
HP HIGH PRESSURE SWITCH
HPWS HIGH PRESSURE WATER SWITCH
JWI CLIPPABEL FIELD SELECTION JUMPER
MOC MOTORIZED CHARGE PRESSURE SWITCH
MOV MOTORIZED VALVE
MVES MOTORIZED VALVE END SWITCH
PDB POWER DISTRIBUTION BLOCK
RVS REVERSING VALVE SOLENOID
TRANS TRANSFORMER
NOTES
1. COMPRESSOR & BLOWER MOTOR THERMALLY PROTECTED INTERNALLY.
2. ALL WIRING TO THE UNIT MUST COMPLY WITH NEC AND LOCAL CODES.
3. TRANSFORMER IS WIRED TO 240V (ORG) LEAD FOR 240/50/1 SWITCH. RED AND ORG LEADS TO PDB(1) AND INSULATE ORG LEAD FOR 220/50/1.
4. FP1 THERMISTER PROVIDES LOW TEMPERATURE PROTECTION FOR WATER. WHEN USING ANTI-FREEZE SOLUTIONS, CUT JW3 JUMPER
5. CHECK INSTALLATION WIRING INFORMATION FOR SPECIFIC THERMOSTAT HOOKUP REFER TO THERMOSTAT INSTALLATION INSTRUCTIONS FOR WIRING TO THE UNIT. WIRE "Y" FROM T-STAT TO "YI" DXM WHEN MOTORIZED VALVE IS NOT USED. T-STAT WIRING MUST BE "CLASS I" AND VOLTAGE RATING EQUAL TO OR GREATER THAN UNIT SUPPLY VOLTAGE. HEAT / COOL THERMOSTATS NOT COMPATIBLE WITH MOTORIZED WATER VALVE
6. 24V ALARM SIGNAL SHOWN. FOR DRY ALARM CONTACT, CUT JW4 JUMPER AND DRY CONTACT WILL BE AVAILABLE BETWEEN AL1 AND AL2.
7. TRANSFORMER SECONDARY GROUND VIA GREEN WIRE WITH YELLOW STRIPE FROM "C" TERMINAL TO CONTROL BOX.
8. BLOWER MOTOR IS FACTORY WIRED FOR MEDIUM AND HIGH SPEEDS. FOR ANY OTHER COMBINATION OF SPEEDS, AT THE MOTOR ATTACH BLACK WIRE TO THE HIGHER OF THE TWO DESIRED SPEED TAPS; AND THE BLUE WIRE TO THE LOWER OF THE TWO DESIRED SPEED TAPS.
DXM CONTROLLER FAULT CODES
OPERATION | STATUS LED (GREEN) | TEST LED (YELLOW) | FAULT LED (RED) | ALARM RELAY
Normal Mode | On | Off | Note 2 | Open
DXM is non-functional | - | Off | Off | Open
Test Mode | - | On | Note 2 | Cycle (Note 3)
Night Setback | Flashing Code 2 | - | Note 2 | -
Emergency Shut Down | Flashing Code 3 | - | Note 2 | -
Invalid T-stat Inputs | Flashing Code 4 | - | Note 2 | -
No Fault in Memory | On | Off | Off | Open
HP Fault / (Lockout) Note 1 | Slow Flash/ (Fast Flash) | Off | Flashing Code 1 | Open / (Closed)
LP Fault / (Lockout) Note 1 | Slow Flash/ (Fast Flash) | Off | Flashing Code 2 | Open / (Closed)
FPI Fault / (Lockout) Note 1 | Slow Flash/ (Fast Flash) | Off | Flashing Code 3 | Open / (Closed)
FP2 Fault / (Lockout) Note 1 | Slow Flash/ (Fast Flash) | Off | Flashing Code 4 | Open / (Closed)
CO Fault / (Lockout) Note 1 | Slow Flash/ (Fast Flash) | Off | Flashing Code 5 | Open / (Closed)
Over-Under Voltage | Slow Flash | Off | Flashing Code 6 | Open / (Closed)
Normal Mode w/UPS | On | Off | Flashing Code 7 | Open (Note 4)
Swapped FPI/FP2 Lockout | Fast Flash | Off | Flashing Code 8 | Cycle (Note 5)
Flashing Code 9 | Closed
1. Status LED (Green) - Slow Flash - Controller in Fault Retry Mode. Fast Flash - Controller in Lockout Mode. Slow Flash = 1 Flash per every 2 seconds, Fast Flash = 2 Flashes per every 1 second.
2. Fault LED (Red) flashes a code representing last fault in memory. If no fault in memory, code 1 is flashed.
3. Cycles appropriate code, by cycling alarm relay in the same sequence as Fault LED.
4. Alarm relay closes after 15 minutes.
5. Alarm relay cycles - closed for 5 seconds and open for 25 seconds.....
POWER SUPPLY REFER TO DATA PLATE USE COPPER CONDUCTORS ONLY
COMPONENT LOCATION
DXM MICROPROCESSOR CONTROL LOGIC
TYPICAL HEAT PUMP T-STAT SEE NOTE 5
SEE NOTE 6 FOR RY CONTACT FOR ALARM
SEE NOTE 7
SEE NOTE 6
SEE NOTE 4
SEE NOTE 8
SEE NOTE 3
S1 DIP SWITCH PACKAGE
S2 DIP SWITCH PACKAGE
UPS: DISABLE/ENABLE
UNIT STAGE 2/1
2 STAGE HEAT / COOL/HEAT PUMP
RV VALVE O/B
DEHUMID/NORMAL
DDC OUTPUT: DDC/NORMAL
BOILERLESS: ENABLE/DISABLE
BOILERLESS: A/T CUT-OUT
ACC1 FUNCTIONS
ACC2 FUNCTIONS
H: HI FAN/DEHUMID NOT USED
FAN ENABLE RELAY
FAN SPEED RELAY
COMPR RELAY
ALARM RELAY
TEST PINS
STATUS
TEST
FAULT
RV RELAY
24V DC
ALARM RELAY
HPWS WTR IN
HPWS WTR OUT
GROUND LUG
POWER DISTRIBUTION BLOCK
EARTH (GND)
N (NEUTRAL)
COMPRESSOR
CAP
RED 220V
ORG 240V
YEL
BLU
BRN
RED
BLK
ORG
GRY
VIO
G/Y
WHT
BRI
BR2
CBI
CC
PDB
GRD
DXM
TRANS
CAP
BM
BMC
YEL OR WHT
BRN
CR
CO
HP
LOC
FPI
FP2
RVS
P1
P2
P3
P6
P7
P8
P9
P10
P11
P12
Y1
Y2
W1
O/W2
G
R
C
ALI
AL2
NSB
ESD
OVR
H
A
NOI
NCI
COM
NO2
NC2
ACC1
ACC2
RELAY
OFFON
Y
COMPRESSOR
O
COOLING
FAN
24 VAC
COMMON
ALARM

Packaged Units
Revised: 02 January, 2013

Typical Wiring Diagram - Single Phase 50 Hz TC Units with CXM Controller and MPC (DDC) Controls

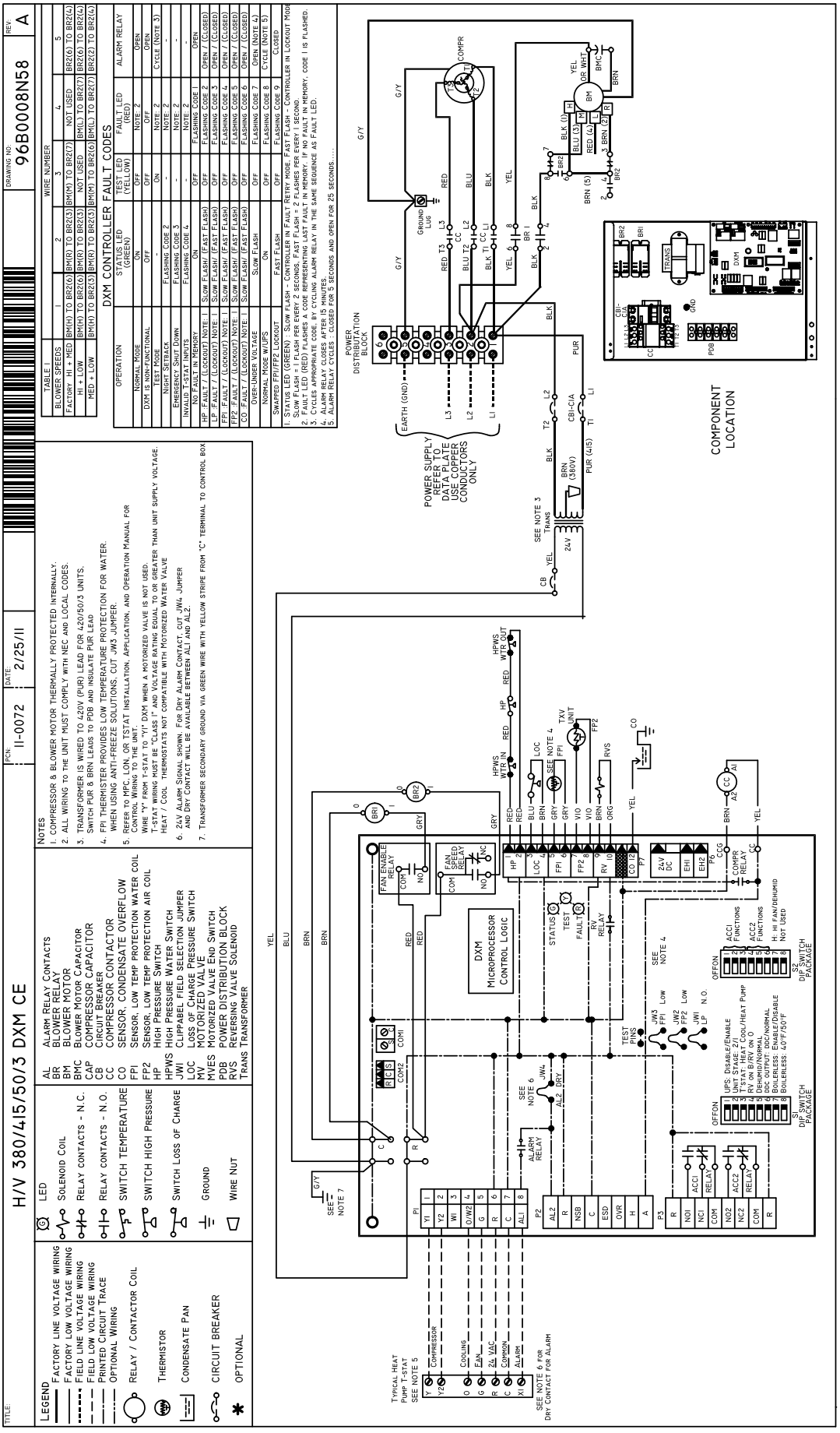

TITLE
H/V 220/240/50/1 CXM W/MPC CE
PCN: 11-0556
DATE: 11/9/11
DRAWING NO: 96B0006N69
REV: D
LEGEND
FACTORY LOW VOLTAGE WIRING
FACTORY LINE VOLTAGE WIRING
FIELD LOW VOLTAGE WIRING
FIELD LINE VOLTAGE WIRING
PRINTED CIRCUIT TRACE
OPTIONAL WIRING
RELAY / CONTACTOR COIL
THERMISTOR
CONDENSATE PAN
CIRCUIT BREAKER
GROUND
OPTIONAL
LED
SOLENOID COIL
RELAY CONTACTS - N.C.
RELAY CONTACTS - N.O.
CAPACITOR
TEMPERATURE SWITCH
LOW PRESSURE SWITCH
HIGH PRESSURE SWITCH
WIRE NUT
SPLICE CAP
AL ALARM RELAY CONTACTS
BM BLOWER MOTOR
BMC BLOWER MOTOR CAPACITOR
BR BLOWER RELAY
CAP COMPRESSOR CAPACITOR
CB CIRCUIT BREAKER
CC COMPRESSOR CONTACTOR
CO CONDENSATE OVERFLOW SENSOR
CR COMPRESSOR RELAY
FPI WATER COIL FREEZE PROTECTION SENSOR
FP2 AIR COIL FREEZE PROTECTION SENSOR
HP HIGH PRESSURE SWITCH
HPWS HIGH PRESSURE WATER SWITCH
JW JUMPER WIRE
LAT LEAVING AIR TEMPERATURE
LOC LOSS OF CHARGE PRESSURE SWITCH
LWT LEAVING WATER TEMPERATURE
MV MOTORIZED VALVE
PDB POWER DISTRIBUTION BLOCK
PI FIELD WIRING TERMINAL BLOCK
RVS REVERSING VALVE SOLENOID
TRANS TRANSFORMER
NOTES:
1. COMPRESSOR AND BLOWER MOTOR THERMALLY PROTECTED INTERNALLY.
2. ALL WIRING TO BE NEC CLASS 1 AND MUST CONFORM TO LOCAL CODES.
3. TRANSFORMER IS WIRED TO 240 V (ORG) LEAD FOR 240/50/1UNITS. SWITCH RED & ORG LEADS TO PB(1) & INSULATE ORG LEAD.
4. FPI THERMISTOR PROVIDES FREEZE PROTECTION FOR WATER. WHEN USING ANTIFREEZE SOLUTIONS, CUT JW3 JUMPER.
5. REFER TO PREMIER OR OEM TEST PROCEDURE FOR SEQUENCE OF OPERATION AND OPERATION MANUAL FOR CONTROL WIRING TO THE UNIT. LOW VOLTAGE WIRING MUST BE CLASS 1 AND VOLTAGE RATED EQUAL OR GREATER THAN UNIT SUPPLY VOLTAGE. FACTORY CUT JUMPER (DAM) BETWEEN AL1 & AL2 AVAILABLE BETWEEN ALARM RELAY CONTACTS. JUMPER DRY CONTACT WILL BE
6. ASW SENSORS ARE NOT REQUIRED ON WATER-WATER APPLICATION. ASW06-ASW08 (WATER-AIR ONLY) MOVE JUMPER TO LSTAT. ASW09-ASW11 MOVE JUMPER TO RNET.
7. TRANSFORMER SECONDARY GROUND VIA CXM/DXM BOARD STANDOFFS & SCREWS TO CONTROL BOX. (GROUND AVAILABLE FROM TOP TWO STANDOFFS AS SHOWN.)
8. BLOWER MOTOR SPEEDS ARE FACTORY WIRED FOR HIGH SPEED COOL. FOR LOW SPEED REMOVE BLU WIRE FROM FAN MOTOR SPEED TAP 'M' AND CONNECT TO 'H' FOR HIGH OR 'L' FOR LOW
9. ASW SENSORS ARE NOT REQUIRED ON WATER-WATER APPLICATION. ASW06-ASW08 (WATER-AIR ONLY) MOVE JUMPER TO LSTAT. ASW09-ASW11 MOVE JUMPER TO RNET.
CXM CONTROLLER FAULT CODES
DESCRIPTION OF OPERATION | LED | ALARM RELAY
NORMAL MODE | ON | OPEN
NORMAL MODE W/ UPS WARNING | ON | CYCLE (CLOSED 5 SEC. OPEN 25 SEC.)
CXM IS NON-FUNCTIONAL | OFF | OPEN
FAULT RETRY | SLOW FLASH | OPEN
LOCKOUT | FAST FLASH | CLOSED
OVER/UNDER VOLTAGE SHUTDOWN | SLOW FLASH | OPEN (CLOSED AFTER 15 MIN.)
TEST MODE-NO FAULT IN MEMORY | FLASHING CODE 1 | CYCLING CODE 1
TEST MODE-HP FAULT IN MEMORY | FLASHING CODE 2 | CYCLING CODE 2
TEST MODE-LP FAULT IN MEMORY | FLASHING CODE 3 | CYCLING CODE 3
TEST MODE-FPI FAULT IN MEMORY | FLASHING CODE 4 | CYCLING CODE 4
TEST MODE FP2-FAULT IN MEMORY | FLASHING CODE 5 | CYCLING CODE 5
TEST MODE-CO FAULT IN MEMORY | FLASHING CODE 6 | CYCLING CODE 6
TEST MODE-OVER/UNDER SHUTDOWN IN MEMORY | FLASHING CODE 7 | CYCLING CODE 7
TEST MODE-UPS IN MEMORY | FLASHING CODE 8 | CYCLING CODE 8
SWAPPED FPI/FP2 LOCKOUT | FLASHING CODE 9 | CYCLING CODE 9
POWER SUPPLY REFER TO DATA PLATE USE COPPER CONDUCTORS ONLY
SEE NOTE 3
COMPONENT LOCATION
SEE NOTE 4
SEE NOTE 6
SEE NOTE 7
CXM MICROPROCESSOR CONTROL LOGIC
STATUS LED
COMPRESSOR RELAY
ALARM RELAY
POLARITY SENSITIVE DDC COMM NETWORK
CLIMATEMASTER MPC GEN 2 SEE NOTE 5
SEE NOTE 9
3 AIR FLOW SETTINGS (FCTRY SETTING - MED) SEE NOTE 6
COMPRESSOR
MPC
CXM
TRANS
PDB
GRD
CAP
CC
CBI
BR

Typical Wiring Diagram - Three Phase 50 Hz TC Units with CXM Controller


TITLE: H/V 380/415/50/3 CXM CE
PCN: 10-0290
DATE: 7/6/10
DRAWING NO: 96B0008N57
REV: C
LEGEND
FACTORY LINE VOLTAGE WIRING
FACTORY LOW VOLTAGE WIRING
FIELD LINE VOLTAGE WIRING
FIELD LOW VOLTAGE WIRING
PRINTED CIRCUIT TRACE
OPTIONAL WIRING
RELAY / CONTACTOR COIL
THERMISTOR
CONDENSATE PAN
CIRCUIT BREAKER
LED
GROUND
WIRE NUT
SOLENOID COIL
RELAY CONTACTS - N.C.
RELAY CONTACTS - N.O.
SWITCH TEMPERATURE
SWITCH HIGH PRESSURE
SWITCH LOSS OF CHARGE
* OPTIONAL WIRING
AL ALARM RELAY CONTACTS
BR BLOWER RELAY
BM BLOWER MOTOR
BMC BLOWER MOTOR CAPACITOR
CAP COMPRESSOR CAPACITOR
CB CIRCUIT BREAKER
CC COMPRESSOR CONTACTOR
CO SENSOR, CONDENSATE OVERFLOW
FPI SENSOR, LOW TEMP PROTECTION, WATER COIL
FP2 SENSOR, LOW TEMP PROTECTION, AIR COIL
HP HIGH PRESSURE SWITCH
HPWS HIGH PRESSURE WATER SWITCH
JWI CUTPABEL FIELD SELECTION JUMPER
LOC LOSS OF CHARGE PRESSURE SWITCH
MV MOTORIZED VALVE
MVES MOTORIZED VALVE END SWITCH
PDB POWER DISTRIBUTION BLOCK
RVS REVERSING VALVE SOLENOID
TRANS TRANSFORMER
NOTES
1. COMPRESSOR & BLOWER MOTOR THERMALLY PROTECTED INTERNALLY.
2. ALL WIRING TO THE UNIT MUST COMPLY WITH NEC AND LOCAL CODES.
3. TRANSFORMER IS WIRED TO 420V (PUR) LEAD FOR 420/50/3 UNITS. SWITCH PUR & BRN LEADS TO PDB AND INSULATE PUR LEAD.
4. FPI THERMISTER PROVIDES LOW TEMPERATURE PROTECTION FOR WATER. WHEN USING ANIT-FREEZE SOLUTIONS, CUT JW3 JUMPER.
5. REFER TO MPC, LON, OR TSTAT INSTALLATION, APPLICATION, AND OPERATION MANUAL FOR CONTROL WIRING TO THE UNIT. WIRE "Y" FROM T-STAT TO "Y" CXM WHEN A MOTORIZED VALVE IS NOT USED. T-STAT WIRING MUST BE "CLASS 1" AND VOLTAGE RATING EQUAL TO OR GREATER THAN UNIT SUPPLY VOLTAGE.
6. 24V ALARM SIGNAL SHOWN. FOR DRY ALARM CONTACT, CUT JWI JUMPER. DRY CONTACT WILL BE AVAILABLE BETWEEN ALI AND AL2.
7. TRANSFORMER SECONDARY GROUND VIA GREEN WIRE WITH YELLOW STRIPE FROM "C" TERMINAL TO CONTROL BOX.
8. BLOWER MOTOR FACTORY WIRED TO MEDIUM SPEED. FOR LOW SPEED REMOVE BLU WIRE FROM MEDIUM TAP AND CONNECT TO LOW SPEED TAP. FOR HIGH SPEED REMOVE BLU WIRE FROM EXISTING SPEED TAP AND REMOVE BRN JUMPERWIRE FROM HIGH SPEED TAP. CONNECT BLUE WIRE TO HIGH SPEED TAP. TAPE OFF UNCONNECTED END OF BRN JUMPER.
CXM CONTROLLER FAULT CODES
DESCRIPTION OF OPERATION | LED | ALARM RELAY
NORMAL MODE | ON | OPEN
NORMAL MODE W/ UPS WARNING | ON | CYCLE (CLOSED 5 SEC. OPEN 25 SEC.)
CXM IS NON-FUNCTIONAL | OFF | OPEN
FAULT RETRY | SLOW FLASH | OPEN
LOCKOUT | FAST FLASH | CLOSED
OVER/UNDER VOLTAGE SHUTDOWN | SLOW FLASH | OPEN (CLOSED AFTER 15 MIN.)
TEST MODE-NO FAULT IN MEMORY | FLASHING CODE 1 | CYCLING CODE 1
TEST MODE-HP FAULT IN MEMORY | FLASHING CODE 2 | CYCLING CODE 2
TEST MODE-LP FAULT IN MEMORY | FLASHING CODE 3 | CYCLING CODE 3
TEST MODE-FPI FAULT IN MEMORY | FLASHING CODE 4 | CYCLING CODE 4
TEST MODE FP2-FAULT IN MEMORY | FLASHING CODE 5 | CYCLING CODE 5
TEST MODE-CO FAULT IN MEMORY | FLASHING CODE 6 | CYCLING CODE 6
TEST MODE-OVER/UNDER SHUTDOWN IN MEMORY | FLASHING CODE 7 | CYCLING CODE 7
TEST MODE-UPS IN MEMORY | FLASHING CODE 8 | CYCLING CODE 8
SWAPPED FPI/FP2 LOCKOUT | FLASHING CODE 9 | CYCLING CODE 9
POWER SUPPLY REFER TO DATA PLATE USE COPPER CONDUCTORS ONLY
EARTH (GND)
N (NEUTRAL)
L3
L2
L1
POWER DISTRIBUTION BLOCK
CB*
SEE NOTE 3
TRANS
24V
BRN (380V)
PUR (415V)
CBI-CIA
TI
COMPONENT LOCATION
COMPR
GROUND LUG
CBI
TRANS
CXM
PDB
GRD
SEE NOTE 8
HPWS W/TP IN
HPWS W/TP OUT
HP
LOC
FPI
FP2
RVS
CO
NOT USED
SEE NOTE 4
COMPRESSOR RELAY
TEST PINS
SEE NOTE 4
JW3 FPI
JW2 FP2
DIP SWITCH
1 UPS DISABLED/ENABLED
2 STAGE 2/1
3 NOT USED
4 DDC OUTPUT: DDC/NORMAL
OFF ON
STATUS LED
CXM MICROPROCESSOR CONTROL LOGIC
JWI
ALARM RELAY
SEE NOTE 6
24V DC
EH1
EH2
P1
P2
P3
SEE NOTE 7
SEE NOTE 5
TYPICAL T-STAT
Y COMPR.
O COOLING
G FAN
R 24VAC
C COMMON
L ALARM
SEE NOTE 6 FOR DRY ALARM CONTACT

Packaged Units
Revised: 02 January, 2013

Typical Wiring Diagram - Three Phase 50 Hz TC Units with DXM Controller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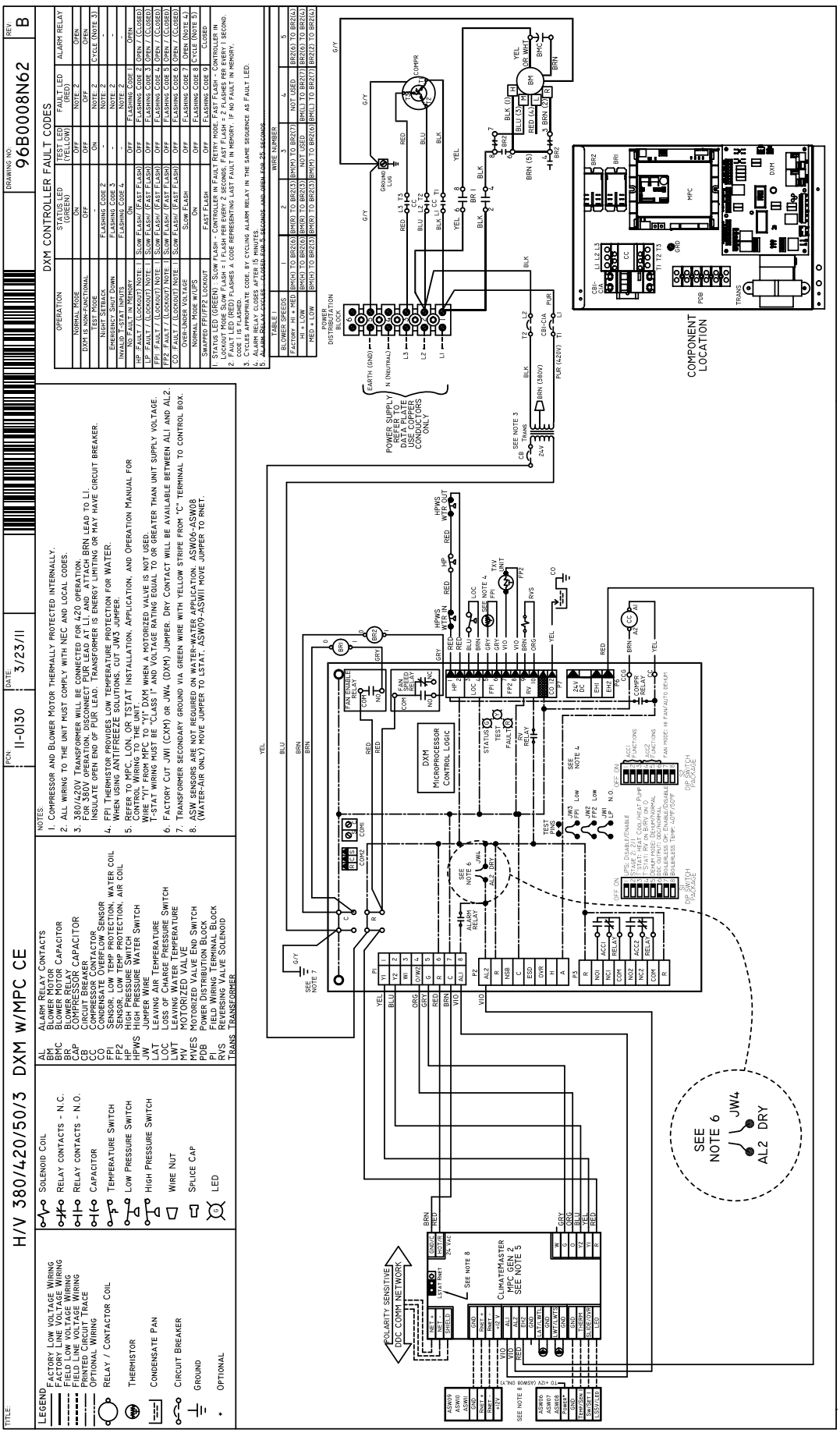
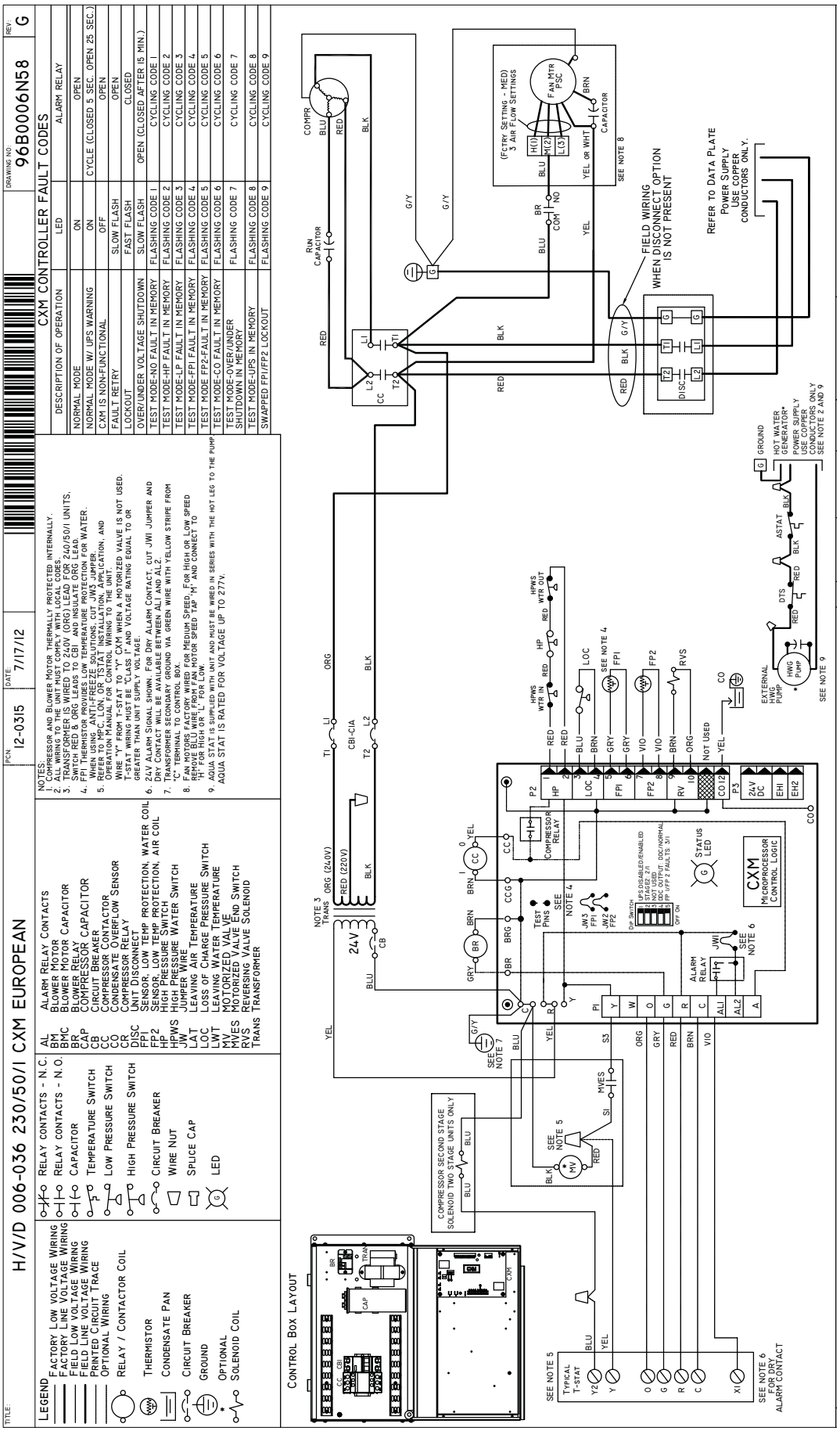
PCN: II-0072
DATE: 2/25/11
DRAWING NO. 96B0008N58
REV: A
LEGEND
FACTORY LINE VOLTAGE WIRING
FACTORY LOW VOLTAGE WIRING
FIELD LINE VOLTAGE WIRING
FIELD LOW VOLTAGE WIRING
PRINTED CIRCUIT TRACE
OPTIONAL WIRING
RELAY / CONTACTOR COIL
THERMISTOR
CONDENSATE PAN
CIRCUIT BREAKER
OPTIONAL
LED
SOLENOID COIL
RELAY CONTACTS - N.C.
RELAY CONTACTS - N.O.
SWITCH TEMPERATURE
SWITCH HIGH PRESSURE
SWITCH LOSS OF CHARGE
GROUND
WIRE NUT
ALARM RELAY CONTACTS
BLOWER RELAY
BLOWER MOTOR
BLOWER MOTOR CAPACITOR
COMPRESSOR CAPACITOR
CIRCUIT BREAKER
COMPRESSOR CONTACTOR
SENSOR, CONDENSATE OVERFLOW
SENSOR, LOW TEMP PROTECTION WATER COIL
SENSOR, LOW TEMP PROTECTION AIR COIL
HIGH PRESSURE SWITCH
HIGH PRESSURE WATER SWITCH
CLIPPABEL FIELD SELECTION JUMPER
LOSS OF CHARGE PRESSURE SWITCH
MOTORIZED VALVE END SWITCH
POWER DISTRIBUTION BLOCK
REVERSING VALVE SOLENOID
TRANSFORMER
NOTES
1. COMPRESSOR & BLOWER MOTOR THERMALLY PROTECTED INTERNALLY.
2. ALL WIRING TO THE UNIT MUST COMPLY WITH NEC AND LOCAL CODES.
3. TRANSFORMER IS WIRED TO 420V (PUR) LEAD FOR 420/50/3 UNITS. SWITCH PUR & BRN LEADS TO PDB AND INSULATE PUR LEAD
4. FPI THERMISTER PROVIDES LOW TEMPERATURE PROTECTION FOR WATER. WHEN USING ANTI-FREEZE SOLUTIONS, CUT JW3 JUMPER.
5. REFER TO MPC, LON, OR TSTAT INSTALLATION, APPLICATION, AND OPERATION MANUAL FOR CONTROL WIRING TO THE UNIT.
WIRE 'T' FROM T-STAT TO THE DXM WHEN A MOTORIZED VALVE IS NOT USED.
TEST 'T' WHEN MOTORIZED VALVE IS USED. T AND VO CAN BE USED TO OPERATE VALVE UP TO 1 AMP.
HEAT / COOL THERMOSTATS NOT COMPATIBLE WITH MOTORIZED WATER VALVE.
6. 24V ALARM SIGNAL SHOWN. FOR DRY ALARM CONTACT, CUT JW4 JUMPER AND DRY CONTACT WILL BE AVAILABLE BETWEEN AL1 AND AL2.
7. TRANSFORMER SECONDARY GROUND VIA GREEN WIRE WITH YELLOW STRIPE FROM "C" TERMINAL TO CONTROL BOX
TABLE 1
BLOWER SPEEDS | 1 | 2 | 3 | 4 | 5
FACTORY HI + MED | BM(H) TO BR2(6) | BM(R) TO BR2(3) | BM(M) TO BR2(7) | NOT USED | BR2(6) TO BR2(4)
HI + LOW | BM(H) TO BR2(6) | BM(R) TO BR2(3) | NOT USED | BM(L) TO BR2(7) | BR2(6) TO BR2(4)
MED + LOW | BM(H) TO BR2(3) | BM(R) TO BR2(3) | BM(M) TO BR2(6) | BM(L) TO BR2(7) | BR2(2) TO BR2(4)
DXM CONTROLLER FAULT CODES
OPERATION | STATUS LED (GREEN) | TEST LED (YELLOW) | FAULT LED (RED) | ALARM RELAY
NORMAL MODE | ON | OFF | NOTE 2 | OPEN
DXM IS NON-FUNCTIONAL | OFF | OFF | OFF | OPEN
NORMAL TEST MODE | FLASHING CODE 2 | ON | NOTE 2 | CYCLE (NOTE 3)
EMERGENCY SHUT DOWN | FLASHING CODE 3 | - | NOTE 2 | -
INVALID T-STAT INPUTS | FLASHING CODE 4 | - | NOTE 2 | -
NO FAULT IN MEMORY | ON | OFF | FLASHING CODE 1 | OPEN
HP - FAULT 1 (LOCKOUT) NOTE: 1 | SLOW FLASH/ (FAST FLASH) | OFF | FLASHING CODE 2 | OPEN / (CLOSED)
LP - FAULT 1 (LOCKOUT) NOTE: 1 | SLOW FLASH/ (FAST FLASH) | OFF | FLASHING CODE 3 | OPEN / (CLOSED)
FPI - FAULT 1 (LOCKOUT) NOTE: 1 | SLOW FLASH/ (FAST FLASH) | OFF | FLASHING CODE 4 | OPEN / (CLOSED)
FP2 - FAULT 1 (LOCKOUT) NOTE: 1 | SLOW FLASH/ (FAST FLASH) | OFF | FLASHING CODE 5 | OPEN / (CLOSED)
CO - FAULT 1 (LOCKOUT) NOTE: 1 | SLOW FLASH/ (FAST FLASH) | OFF | FLASHING CODE 6 | OPEN / (CLOSED)
OVER-UNDER VOLTAGE | SLOW FLASH | OFF | FLASHING CODE 7 | OPEN (NOTE 4)
NORMAL MODE W/UPS | ON | OFF | FLASHING CODE 8 | CYCLE (NOTE 5)
SWAPPED FP1/FP2 LOCKOUT | FAST FLASH | OFF | FLASHING CODE 9 | CLOSED
1. STATUS LED (GREEN) - SLOW FLASH - CONTROLLER IN FAULT RETRY MODE. FAST FLASH - CONTROLLER IN LOCKOUT MODE
2. TEST LED (YELLOW) - FLASHES A CODE REPRESENTING LAST FAULT IN MEMORY. (SEE TABLE FOR CODES)
3. FAULT LED (RED) FLASHES A CODE REPRESENTING LAST FAULT IN MEMORY. IF NO FAULT IN MEMORY, CODE 1 IS FLASHED.
4. CYCLES APPROPRIATE CODE BY CYCLING ALARM RELAY IN THE SAME SEQUENCE AS FAULT LED.
5. ALARM RELAY CLOSES AFTER 15 MINUTES.
6. ALARM RELAY CYCLES - CLOSED FOR 5 SECONDS AND OPEN FOR 25 SECONDS....
POWER SUPPLY REFER TO DATA PLATE USE COPPER CONDUCTORS ONLY
EARTH (GND)
POWER DISTRIBUTION BLOCK
SEE NOTE 3
TRANS
24V
CB
YEL
BRN (380V)
PUR (415)
CBI-C1A
COMPONENT LOCATION
DXM MICROPROCESSOR CONTROL LOGIC
FAN ENABLE RELAY
FAN SPEED RELAY
COMPR CONTACTOR RELAY
ALARM RELAY
REV VALVE RELAY
STATUS
TEST
FAULT
SEE NOTE 4
SEE NOTE 6
SEE NOTE 7
UPS DISABLE/ENABLE
UNIT STAGE 2/1
TEST MODE
DEHUMID/NORMAL
RV ON B/RV ON O
ACC1 FUNCTIONS
ACC2 FUNCTIONS
HI FAN/DEHUMID
NOT USED
S1 DIP SWITCH PACKAGE
S2 DIP SWITCH PACKAGE
TYPICAL HEAT PUMP T-STAT SEE NOTE 5
Y COMPRESSOR
Y2
COOLING
O
G FAN
24 VAC
R
COMMON
C
ALARM
XI
SEE NOTE 6 FOR DRY CONTACT FOR ALARM
COMPR
BM
BMC
CAP
TXV UNIT
HPWS
HP
LOC
FPI
FP2
RVS
CO
PDB
DXM
TRANS
GND
GROUND LUG

Typical Wiring Diagram - Three Phase 50 Hz TC Units with DXM Controller and MPC (DDC) Controls

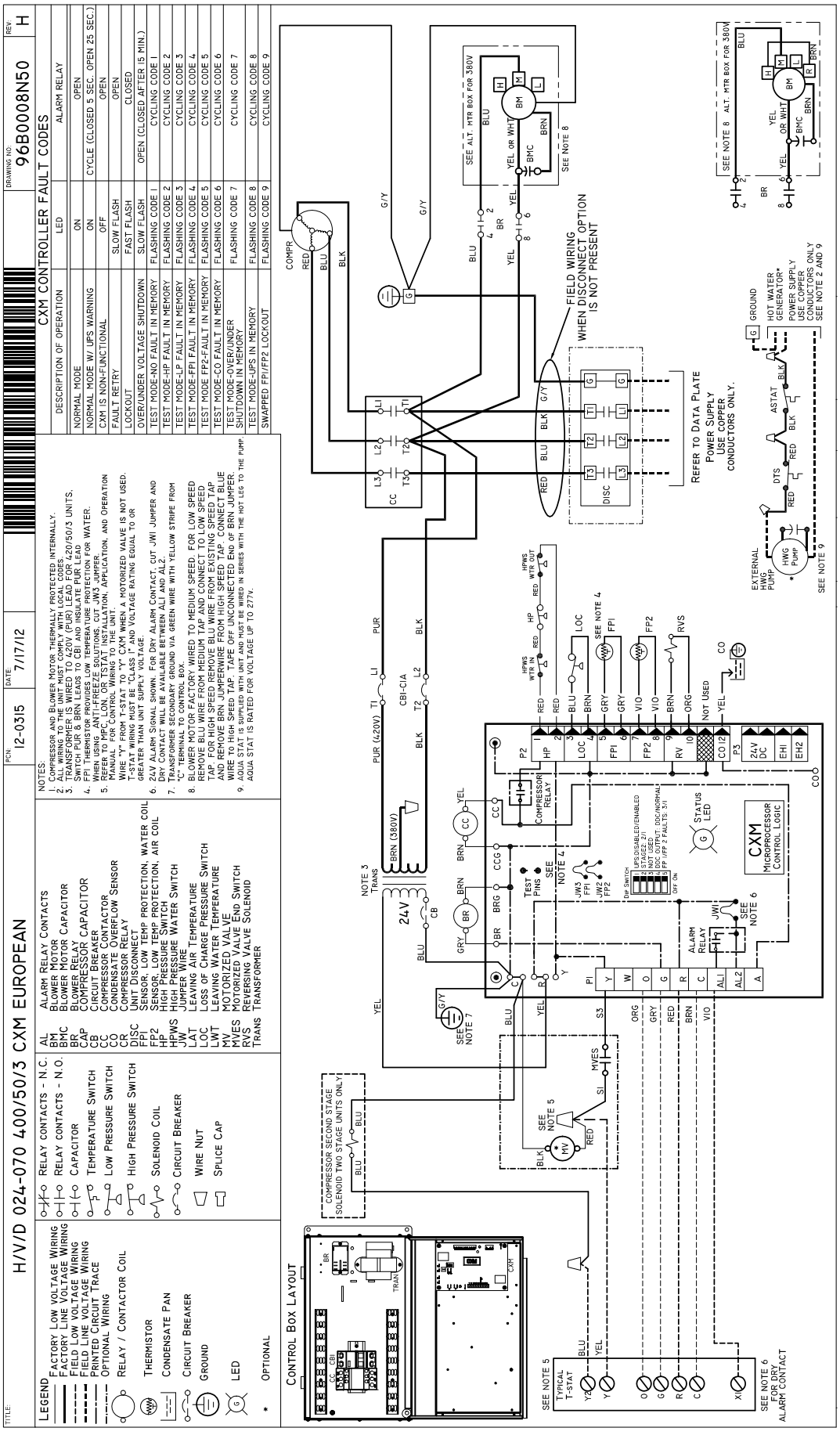

TITLE: H/V 380/420/50/3 DXM W/MPC CE
PCN: 11-0130
DATE: 3/23/11
DRAWING NO: 96B0008N62
REV: B
DXM CONTROLLER FAULT CODES
OPERATION | STATUS LED (GREEN) | TEST LED (YELLOW) | FAULT LED (RED) | ALARM RELAY
Normal Mode | ON | NOTE 2 | OFF | OPEN
DXM is non-functional | OFF | OFF | OFF | OPEN
Test Mode | - | ON | NOTE 2 | OPEN
Night Setback | Flashing Code 2 | - | NOTE 2 | Cycle (note 3)
Emergency Shut Down | Flashing Code 3 | - | NOTE 2 | -
Invalid 4-20 mA Input | Flashing Code 4 | - | NOTE 2 | -
Low Water Temperature | ON | OFF | ON | Cycle (note 4)
HP Fault / (Lockout) note 1 | Slow Flash/ (Fast Flash) | OFF | Flashing Code 1 | OPEN
LP Fault / (Lockout) note 1 | Slow Flash/ (Fast Flash) | OFF | Flashing Code 2 | Open / (Closed)
FP1 Fault / (Lockout) note 1 | Slow Flash/ (Fast Flash) | OFF | Flashing Code 3 | Open / (Closed)
FP2 Fault / (Lockout) note 1 | Slow Flash/ (Fast Flash) | OFF | Flashing Code 5 | Open / (Closed)
CO Fault / (Lockout) note 1 | Slow Flash/ (Fast Flash) | OFF | Flashing Code 6 | Open / (Closed)
Over/Under Voltage | Slow Flash | OFF | Flashing Code 7 | Cycle (note 4)
Normal Mode w/UPS | On | OFF | Flashing Code 8 | Cycle (note 4)
Swapped FP1/FP2 Lockout | Fast Flash | OFF | Flashing Code 9 | Closed
1. Status LED (Green) - Slow Flash - Controller in Fault Retry Mode. Fast Flash - Controller in Lockout Mode Slow Flash = 1 flash per every 2 seconds. Fast Flash = 2 flashes per every 1 second.
2. Fault LED (Red) flashes a code representing last fault in memory, if no fault in memory, LED will be off.
3. Cycles appropriate code, by cycling alarm relay in the same sequence as fault led.
4. Alarm relay closes after 15 minutes.
5. Alarm relay closes - closed 10 seconds and open for 25 seconds.
TABLE 1
BLOWER SPEEDS | 1 | 2 | 3 | 4 | 5
Factory: Hi + Med | (BM-HI) to (BR2-6) | (BM-HI) to (BR2-3) | (BM-M) to (BR2-7) | not used | (BR2-6) to (BR2-A)
Hi + Low | (BM-HI) to (BR2-6) | (BM-HI) to (BR2-3) | not used | (BM-L) to (BR2-7) | (BR2-6) to (BR2-A)
Med + Low | (BM-M) to (BR2-6) | (BM-M) to (BR2-3) | (BM-M) to (BR2-6) | (BM-L) to (BR2-7) | (BR2-2) to (BR2-A)
LEGEND
Factory Low Voltage Wiring
Factory Line Voltage Wiring
Field Low Voltage Wiring
Field Line Voltage Wiring
Printed Circuit Trace
Optional Wiring
Relay / Contactor Coil
Thermistor
Condensate Pan
Circuit Breaker
Ground
Optional
AL Alarm Relay Contacts
BM Blower Motor
BMC Blower Motor Capacitor
BR Blower Relay
CAP Compressor Capacitor
CB Circuit Breaker
CC Compressor Contactor
CO Condensate Overflow Sensor
FP1 Sensor, Low Temp Protection, Water Coil
FP2 Sensor, Low Temp Protection, Air Coil
HP High Pressure Switch
HPWS High Pressure Water Switch
JW Jumper Wire
LAT Leaving Air Temperature
LOC Loss of Charge Pressure Switch
LWT Leaving Water Temperature
MV Motorized Valve
MVES Motorized Valve End Switch
PDB Power Distribution Block
PL Field Wiring Terminal Block
RVS Reversing Valve Solenoid
TRANS Transformer
NOTES:
1. Compressor and Blower Motor thermally protected internally.
2. All wiring to the unit must comply with NEC and local codes.
3. 380/420V Transformer will be connected for 420 operation. For 380V operation, disconnect BRN lead to L1. Insulate open end of PUR lead. Transformer is energy limiting or may have circuit breaker.
4. FP1 Thermistor provides low temperature protection for water. When using antifreeze solutions, cut JW3 jumper.
5. Refer to MPC, LON, or TSTAT installation, application, and operation manual for control wiring to the unit.
6. Factory cut JW1 (CXM) or JW4 (DXM) jumper. Dry contact will be available between AL1 and AL2.
7. Transformer secondary ground via green wire with yellow stripe from "C" terminal to control box.
8. ASW sensors are not required on water-water application. ASW06-ASW08 (water-air only) move jumper to LSTAT. ASW09-ASW11 move jumper to RNET.
POWER SUPPLY REFER TO DATA PLATE USE COPPER CONDUCTORS ONLY!
SEE NOTE 3
CB TRIPS AT 2.4V
PUR (420V) T1
BRN (380V) T2
BLK L2
CB-C1A
PUR L1
EARTH (GND)
N (NEUTRAL)
L3 L2 L1
POWER DISTRIBUTION BLOCK
COMPONENT LOCATION
CB1-
TRANS
PDB
GRD
CC
MPC
DXM
BM
BMC
BR
CAP
FAN SPEED RELAY
DXM MICROPROCESSOR CONTROL LOGIC
STATUS
TEST
FAULT
AY RELAY
ALARM RELAY
COMPR RELAY
DIP SWITCH FACTORY DEFAULT
DIP SWITCH FACTORY DEFAULT
SEE NOTE 6
JW4 DRY
AL2
SEE NOTE 4
SEE NOTE 7
SEE NOTE 8
POLARITY SENSITIVE DDC COMM NETWORK
CLIMATEMASTER MPC GEN 2 SEE NOTE 5
LSTAT RNET
24 VAC
TO +12V (ASW08 ONLY)
ASW09 ASW10 ASW11
ASW01 ASW02 ASW03 ASW04 ASW05 ASW06 ASW07 ASW08

Packaged Units
Revised: 02 January, 2013

Typical Wiring Diagram - Single Phase TS Units 50Hz (Size 009-036) with CXM Controller


TITLE: H/V/D 006-036 230/50/1 CXM EUROPEAN
PCN 12-0315
DATE: 7/17/12
DRAWING NO. 96B0006N58
REV: G
LEGEND
Factory Low Voltage Wiring
Factory Line Voltage Wiring
Field Low Voltage Wiring
Field Line Voltage Wiring
Printed Circuit Trace
Optional Wiring
Relay / Contactor Coil
Thermistor
Condensate Pan
Circuit Breaker
Ground
Optional Solenoid Coil
Relay Contacts - N.C.
Relay Contacts - N.O.
Capacitor
Temperature Switch
Low Pressure Switch
High Pressure Switch
Circuit Breaker
Wire Nut
Splice Cap
LED
AL Alarm Relay Contacts
BM Blower Motor
BMC Blower Motor Capacitor
BR Blower Relay
CAP Compressor Capacitor
CB Circuit Breaker
CC Compressor Contactor
CO Condensate Overflow Sensor
CR Compressor Relay
DISC Unit Disconnect
EPS Electronic Temp Protection, Water Coil
FP1 Sensor, Low Temp Protection, Air Coil
FP2 High Pressure Switch
HP High Pressure Water Switch
HPWS Jumper Wire
JW Leaving Air Temperature
LAT Loss of Charge Pressure Switch
LOC Leaving Water Temperature
LWT Motorized Valve
MV Motorized Valve End Switch
MVES Reversing Valve Solenoid
RVS Trans Transformer
NOTES:
1. Compressor and Blower Motor Thermally Protected Internally.
2. All wiring is to meet NEC Class 1 wiring codes.
3. Transformer is wired to 240v (org) lead for 240/50/1 units. Switch red & org leads to CB1 and insulate org lead.
4. FP1 Thermistor provides low temperature protection for water.
5. When using anti-freeze solutions, cut JW3 jumper. Refer to Table 1 for operation limits and application, and Operation Manual for control wiring to the unit.
6. 24V alarm signal shown. For dry alarm contact, cut JW1 jumper and wire "Y" from T-stat to "Y" CXM when a motorized valve is not used. T-stat wiring must be "Class 1" and voltage rating equal to or greater than unit supply voltage.
7. Transformer secondary ground via green wire with yellow stripe from "G" terminal to control box.
8. Fan motors factory wired for medium speed. For high or low speed remove blu wire from fan motor speed tap "M" and connect to "H" for high or "L" for low.
9. Aqua stat is supplied with unit and must be wired in series with the hot leg to the pump. Aqua stat is rated for voltage up to 277v.
CXM CONTROLLER FAULT CODES
DESCRIPTION OF OPERATION | LED | ALARM RELAY
NORMAL MODE | ON | OPEN
NORMAL MODE W/ UPS WARNING | ON | CYCLE (CLOSED 5 SEC. OPEN 25 SEC.)
CXM IS NON-FUNCTIONAL | OFF | OPEN
FAULT RETRY | SLOW FLASH | OPEN
LOCKOUT | FAST FLASH | CLOSED
OVER/UNDER VOLTAGE SHUTDOWN | SLOW FLASH | OPEN (CLOSED AFTER 15 MIN.)
TEST MODE-NO FAULT IN MEMORY | FLASHING CODE 1 | CYCLING CODE 1
TEST MODE-HP FAULT IN MEMORY | FLASHING CODE 2 | CYCLING CODE 2
TEST MODE-LP FAULT IN MEMORY | FLASHING CODE 3 | CYCLING CODE 3
TEST MODE-FP1 FAULT IN MEMORY | FLASHING CODE 4 | CYCLING CODE 4
TEST MODE FP2-FAULT IN MEMORY | FLASHING CODE 5 | CYCLING CODE 5
TEST MODE-CO FAULT IN MEMORY | FLASHING CODE 6 | CYCLING CODE 6
TEST MODE-OVER/UNDER SHUTDOWN IN MEMORY | FLASHING CODE 7 | CYCLING CODE 7
TEST MODE-UPS IN MEMORY | FLASHING CODE 8 | CYCLING CODE 8
SWAPPED FP1/FP2 LOCKOUT | FLASHING CODE 9 | CYCLING CODE 9
Control Box Layout
CXM
Microprocessor Control Logic
Compressor Second Stage Solenoid Two Stage Units Only
Typical T-Stat
See Note 5
See Note 6 For Dry Alarm Contact
Field Wiring When Disconnect Option Is Not Present
Refer to Data Plate Power Supply Use Copper Conductors Only.
See Note 8
See Note 9
Hot Water Generator*
Power Supply Use Copper Conductors Only
See Note 2 and 9
External HWG Pump*
Astat
Compressor Relay
Alarm Relay
Status LED
Run Capacitor
Fan Mtr PSC
Capacitor
Fctry Setting - Med) 3 Air Flow Settings
Ground
Test Pins
See Note 4
See Note 7
See Note 6
HPWS Wtr In
HPWS Wtr Out
Trans 24V
Org (240V)
Red (220V)
Not Used
Compr

Typical Wiring Diagram - Three Phase TS Units 50Hz (Size 024 - 070) with CXM Controller


TITLE: H/V/D 024-070 400/50/3 CXM EUROPEAN
P/O#: 12-0315
DATE: 7/17/12
DRAWING NO: 96B0008N50
REV: H
LEGEND
Factory Low Voltage Wiring
Factory Line Voltage Wiring
Field Low Voltage Wiring
Field Line Voltage Wiring
Printed Circuit Trace
Optional Wiring
Relay / Contactor Coil
Thermistor
Condensate Pan
Circuit Breaker
Ground
LED
Optional
Relay Contacts - N.C.
Relay Contacts - N.O.
Capacitor
Temperature Switch
Low Pressure Switch
High Pressure Switch
Solenoid Coil
Circuit Breaker
Wire Nut
Splice Cap
AL Alarm Relay Contacts
BM Blower Motor
BMC Blower Motor Capacitor
BR Blower Relay
CAP Compressor Capacitor
CB Circuit Breaker
CC Compressor Contactor
CO Condensate Overflow Sensor
CR Compressor Relay
DISC Unit Disconnect
FP1 Sensor, Low Temp Protection, Water Coil
FP2 Sensor, Low Temp Protection, Air Coil
HPWS High Pressure Water Switch
JW Jumper Wire
LAT Leaving Air Temperature
LOC Loss of Charge Pressure Switch
LWT Leaving Water Temperature
MV Motorized Valve
MVES Motorized Valve End Switch
RVS Reversing Valve Solenoid
TRANS Transformer
NOTES:
1. Compressor and Blower Motor thermally protected internally.
2. All wiring to the unit must comply with local codes.
3. Transformer is wired to 420V (PUR) lead for 420/50/3 units. Switch PUR & BRN leads to CB1 and insulate PUR lead.
4. FP1 thermistor provides low temperature protection for water. When using ANTI-FREEZE solutions, cut JW3 jumper.
5. Refer to MPC, LON, or TSTAT installation, application, and operation manual for control wiring to the unit.
Wire "Y" from T-stat to "Y" CXM when a motorized valve is not used. T-stat wiring must be Class 1 and voltage rating equal to or greater than unit supply voltage.
6. 24V alarm signal shown. For dry alarm contact, cut JW1 jumper and dry contact will be available between AL1 and AL2.
7. Transformer secondary ground via green wire with yellow stripe from "C" terminal to control box.
8. Blower motor factory wired to medium speed. For low speed remove blu wire from medium tap and connect to low speed tap. For high speed remove blu wire from existing speed tap and remove brn jumperwire from high speed tap. Connect blue wire to high speed tap. Tape off unconnected end of brn jumper.
9. Aquastat is shipped with wire and must be wired in series with the hot legs to the pump. Aqua stat is rated for voltage up to 277v.
CXM CONTROLLER FAULT CODES
DESCRIPTION OF OPERATION | LED | ALARM RELAY
NORMAL MODE | ON | OPEN
NORMAL MODE W/ UPS WARNING | ON | CYCLE (CLOSED 5 SEC. OPEN 25 SEC.)
CXM IS NON-FUNCTIONAL | OFF | OPEN
FAULT RETRY | SLOW FLASH | OPEN
LOCKOUT | FAST FLASH | CLOSED
OVER/UNDER VOLTAGE SHUTDOWN | SLOW FLASH | OPEN (CLOSED AFTER 15 MIN.)
TEST MODE-NO FAULT IN MEMORY | FLASHING CODE 1 | CYCLING CODE 1
TEST MODE-HP FAULT IN MEMORY | FLASHING CODE 2 | CYCLING CODE 2
TEST MODE-LP FAULT IN MEMORY | FLASHING CODE 3 | CYCLING CODE 3
TEST MODE-FP1 FAULT IN MEMORY | FLASHING CODE 4 | CYCLING CODE 4
TEST MODE FP2-FAULT IN MEMORY | FLASHING CODE 5 | CYCLING CODE 5
TEST MODE-CO FAULT IN MEMORY | FLASHING CODE 6 | CYCLING CODE 6
TEST MODE-OVER/UNDER SHUTDOWN IN MEMORY | FLASHING CODE 7 | CYCLING CODE 7
TEST MODE-UPS IN MEMORY | FLASHING CODE 8 | CYCLING CODE 8
SWAPPED FP1/FP2 LOCKOUT | FLASHING CODE 9 | CYCLING CODE 9
Control Box Layout
Typical T-STAT
See Note 5
See Note 6 For Dry Alarm Contact
Compressor Second Stage Solenoid Two Stage Units Only
Field Wiring When Disconnect Option Is Not Present
Refer to Data Plate Power Supply Use Copper Conductors Only.
See Alt. Mtr Box For 380V
See Note 8
Hot Water Generator* Power Supply Use Copper Conductors Only See Note 2 and 9
External HWG Pump
See Note 9
CXM Microprocessor Control Logic
Status LED
Dip Switch
Test Pins
See Note 4
Compressor Relay
Alarm Relay
Aquastat
DTS
Ground

Packaged Units
Revised: 02 January, 2013

CXM Controls

CXM Control - For detailed control information, see CXM or DXM Application, Operation and Maintenance (AOM) manual (part # 97B0003N12 or part #97B0003N13).

Field Selectable Inputs - Test mode: Test mode allows the service technician to check the operation of the control in a timely manner. By momentarily shorting the test terminals, the CXM control enters a 20 minute test mode period in which all time delays are sped up 15 times. Upon entering test mode, the status LED will flash a code representing the last fault. For diagnostic ease at the thermostat, the alarm relay will also cycle during test mode. The alarm relay will cycle on and off similar to the status LED to indicate a code representing the last fault, at the thermostat. Test mode can be exited by shorting the test terminals for 3 seconds.
Retry Mode: If the control is attempting a retry of a fault, the status LED will slow flash (slow flash = one flash every 2 seconds) to indicate the control is in the process of retrying.

Field Configuration Options - Note: In the following field configuration options, jumper wires should be clipped ONLY when power is removed from the CXM control.

Water coil low temperature limit setting: Jumper 3 (JW3-FP1 Low Temp) provides field selection of temperature limit setting for FP1 of -1°C or -12°C] (refrigerant temperature).
Not Clipped = -1°C. Clipped = -12°C.
Air coil low temperature limit setting: Jumper 2 (JW2-FP2 Low Temp) provides field selection of temperature limit setting for FP2 of -1°C or -12°C (refrigerant temperature). **Note: This jumper should only be clipped under extenuating circumstances, as recommended by the factory.**
Not Clipped = -1°C. Clipped = -12°C.
Alarm relay setting: Jumper 1 (JW1-AL2 Dry) provides field selection of the alarm relay terminal AL2 to be jumpered to 24VAC or to be a dry contact (no connection).
Not Clipped = AL2 connected to R. Clipped = AL2 dry contact (no connection).

DIP Switches - Note: In the following field configuration options, DIP switches should only be changed when power is removed from the CXM control.

DIP switch 1: Unit Performance Sentinel Disable **-** provides field selection to disable the UPS feature.
On = Enabled. Off = Disabled.

DIP switch 2: Stage 2 Selection - provides selection of whether compressor has an "on" delay. If set to stage 2, the compressor will have a 3 second delay before energizing. Also, if set for stage 2, the alarm relay will NOT cycle during test mode.
On = Stage 1. Off = Stage 2
DIP switch 3: Not Used.
DIP switch 4**:** DDC Output at EH2 - provides selection for DDC operation. If set to "DDC Output at EH2," the EH2 terminal will continuously output the last fault code of the controller. If set to "EH2 normal," EH2 will operate as standard electric heat output.
On = EH2 Normal. Off = DDC Output at EH2.
Note: Some CXM controls only have a 2 position DIP switch package. If this is the case, this option can be selected by clipping the jumper which is in position 4 of SW1.
Jumper not clipped = EH2 Normal. Jumper clipped = DDC Output at EH2.
DIP switch 5: Factory Setting - Normal position is "On." Do not change selection unless instructed to do so by the factory.

Table 6a: CXM/DXM LED And Alarm Relay Operations

Description of Operation	LED	Alarm Relay
Normal Mode	On	Open
Normal Mode with UPS Warning	On	Cycle (closed 5 sec., Open 25 sec.)
CXM is non-functional	Off	Open
Fault Retry	Slow Flash	Open
Lockout	Fast Flash	Closed
Over/Under Voltage Shutdown	Slow Flash	Open (Closed after 15 minutes)
Test Mode - No fault in memory	Flashing Code 1	Cycling Code 1
Test Mode - HP Fault in memory	Flashing Code 2	Cycling Code 2
Test Mode - LP Fault in memory	Flashing Code 3	Cycling Code 3
Test Mode - FP1 Fault in memory	Flashing Code 4	Cycling Code 4
Test Mode - FP2 Fault in memory	Flashing Code 5	Cycling Code 5
Test Mode - CO Fault in memory	Flashing Code 6	Cycling Code 6
Test Mode - Over/Under shutdown in memory	Flashing Code 7	Cycling Code 7
Test Mode - UPS in memory	Flashing Code 8	Cycling Code 8
Test Mode - Swapped Thermistor	Flashing Code 9	Cycling Code 9

-Slow Flash = 1 flash every 2 seconds
-Fast Flash = 2 flashes every 1 second
-Flash code 2 = 2 quick flashes, 10 second pause, 2 quick flashes, 10 second pause, etc.
-On pulse 1/3 second; off pulse 1/3 second

⚠ CAUTION! ⚠

CAUTION! Do not restart units without inspection and remedy of faulting condition. Equipment damage may occur.

DXM Controls

DXM Control - For detailed control information, see CXM AOM (part # 97B0003N12), DXM AOM (part #97B0003N13), Lon controller AOM (part #97B0013N01) or MPC AOM (part # 97B0031N01).

Table 6b: DXM LED And Alarm Relay Operations

Description of Operation	Status LED (green)	Test LED (yellow)	Fault LED (red)	Alarm Relay
Normal mode	On	-	Off	Open
Normal mode with UPS	On	-	Flashing Code 8	Cycle (closed 5 sec, open 25 sec)
DXM is non-functional	Off	Off	Off	Open
Fault Retry	Slow Flash	-	Flashing fault code	Open
Lockout	Fast Flash	-	Flashing fault code	Closed
Test Mode	-	On	-	-
Night Setback	Flashing Code 2	-	-	-
ESD	Flashing Code 3	-	-	-
Invalid T-stat Inputs	Flashing Code 4	-	-	-
HP Fault	Slow Flash	-	Flashing Code 2	Open
LP Fault	Slow Flash	-	Flashing Code 3	Open
FP1 Fault	Slow Flash	-	Flashing Code 4	Open
FP2 Fault	Slow Flash	-	Flashing Code 5	Open
CO Fault	Slow Flash	-	Flashing Code 6	Open
Over/Under Voltages	Slow Flash	-	Flashing Code 7	Open (closed after 15 minutes)

-Slow Flash = 1 flash every 2 seconds
-Fast Flash = 2 flashes every 1 second
-Flash code 2 = 2 quick flashes, 10 second pause, 2 quick flashes, 10 second pause, etc.
-On pulse 1/3 second; off pulse 1/3 second

Field Selectable Inputs - Test mode: Test mode allows the service technician to check the operation of the control in a timely manner. By momentarily shorting the test terminals, the DXM control enters a 20 minute test mode period in which all time delays are sped up 15 times. Upon entering test mode, the status LED will flash a code representing the last fault. For diagnostic ease at the thermostat, the alarm relay will also cycle during test mode. The alarm relay will cycle on and off similar to the status LED to indicate a code representing the last fault, at the thermostat. Test mode can be exited by shorting the test terminals for 3 seconds.

Retry mode: If the control is attempting a retry of a fault, the status LED will slow flash (slow flash = one flash every 2 seconds) to indicate the control is in the process of retrying.

Field Configuration Options - Note: In the following field configuration options, jumper wires should be clipped ONLY when power is removed from the DXM control.

Water coil low temperature limit setting: Jumper 3 (JW3-FP1 Low Temp) provides field selection of temperature limit setting for FP1 of -1°C or -12°C (refrigerant temperature).
Not Clipped = -1°C. Clipped = -12°C.

Air coil low temperature limit setting: Jumper 2 (JW2-FP2 Low Temp) provides field selection of temperature limit setting for FP2 of -1°C or -12°C] (refrigerant temperature). **Note: This jumper should only be clipped under extenuating circumstances, as recommended by ClimateMaster technical services.**
Not Clipped = -1°C. Clipped = -12°C.
Alarm relay setting: Jumper 4 (JW4-AL2 Dry) provides field selection of the alarm relay terminal AL2 to be jumpered to 24VAC or to be a dry contact (no connection).
Not Clipped = AL2 connected to R.
Clipped = AL2 dry contact
(no connection).
Low pressure normally open: Jumper 1 (JW1-LP norm open) provides field selection for low pressure input to be normally closed or normally open.
Not Clipped = LP normally closed. Clipped = LP normally open.

DIP Switches - Note: In the following field configuration options, DIP switches should only be changed when power is removed from the DXM control.

DIP Package #1 (S1) - DIP Package #1 has 8 switches and provides the following setup selections:
1.1 - Unit Performance Sentinel (UPS) disable: DIP Switch 1.1 provides field selection to disable the UPS feature. On = Enabled. Off = Disabled.
1.2 - Compressor relay staging operation: DIP 1.2 provides selection of compressor relay staging operation. The compressor relay can be selected to turn on with a stage 1 or stage 2 call from the thermostat. This is used with dual stage units (2 compressors where 2 DXM controls are being used) or with master/slave applications. In master/slave applications, each compressor and fan will stage according to its appropriate DIP 1.2 setting. If set to stage 2, the compressor will have a 3 second on-delay before energizing during a Stage 2 demand. Also, if set for stage 2, the alarm relay will NOT cycle during test mode.On = Stage 1. Off = Stage 2.
1.3 - Thermostat type (heat pump or heat/cool): DIP 1.3 provides selection of thermostat type. Heat pump or heat/cool thermostats can be selected. When in heat/cool mode, Y1 is the input call for cooling stage 1; Y2 is the input call for cooling stage 2; W1 is the input call for heating stage 1; and O/W2 is the input call for heating stage 2. In heat pump mode, Y1 is the input call for compressor stage 1; Y2 is the input call for compressor stage 2; W1 is the input call for heating stage 3 or emergency heat; and O/W2 is the input call for reversing valve (heating or cooling, depending upon DIP 1.4).
On = Heat Pump. Off = Heat/Cool.

1.4 - Thermostat type (O/B): DIP 1.4 provides selection of thermostat type for reversing valve activation. Heat pump thermostats with "O" output (reversing valve energized for cooling) or "B" output (reversing valve energized for heating) can be selected with DIP 1.4.
On = HP stat with "O" output for cooling. Off = HP stat with "B" output for heating.
1.5 - Dehumidification mode: DIP 1.5 provides selection of normal or dehumidification fan mode. In dehumidification mode, the fan speed relay will remain off during cooling stage 2. In normal mode, the fan speed relay will turn on during cooling stage 2.
On = Normal fan mode. Off = Dehumidification mode.
1.6 - DDC output at EH2: DIP 1.6 provides selection for DDC operation. If set to "DDC Output at EH2," the EH2 terminal will continuously output the last fault code of the controller. If set to "EH2 normal," EH2 will operate as standard electric heat output.
On = EH2 Normal. Off = DDC Output at EH2.
1.7 - Boilerless operation: DIP 1.7 provides selection of boilerless operation. In boilerless mode, the compressor is only used for heating when FP1 is above the temperature specified by the setting of DIP 1.8. Below DIP 1.8 setting, the compressor is not used and the control goes into emergency heat mode, staging on EH1 and EH2 to provide heating.
On = normal. Off = Boilerless operation.
1.8 - Boilerless changeover temperature: DIP 1.8 provides selection of boilerless changeover temperature setpoint. Note that the FP1 thermistor is sensing refrigerant temperature between the coaxial heat exchanger and the expansion device (TXV). Therefore, the 10°C setting is not 10°C water, but approximately 16°C EWT.
On = 10°C. Off = 16°C.

DIP Package #2 (S2) - DIP Package #2 has 8 switches and provides the following setup selections:
2.1 - Accessory1 relay personality: DIP 2.1 provides selection of ACC1 relay personality (relay operation/ characteristics). See table 6c for description of functionality.
2.2 - Accessory1 relay personality: DIP 2.2 provides selection of ACC 1 relay personality (relay operation/ characteristics). See table 6c for description of functionality.
2.3 - Accessory1 relay personality: DIP 2.3 provides selection of ACC 1 relay options. See table 6c for description of functionality.
2.4 - Accessory2 relay personality: DIP 2.4 provides selection of ACC 2 relay personality (relay operation/ characteristics). See table 6c for description of functionality.
2.5 - Accessory2 relay personality: DIP 2.5 provides selection of ACC 2 relay personality (relay operation/ characteristics). See table 6c for description of functionality.
2.6 - Accessory2 relay personality: DIP 2.6 provides selection of ACC 2 relay options. See table 6c for description of functionality.
2.7 - Auto dehumidification fan mode or high fan mode: DIP 2.7 provides selection of auto dehumidification fan mode or high fan mode. In auto dehumidification mode, the fan speed relay will remain off during cooling stage 2 IF the H input is active. In high fan mode, the fan enable and fan speed relays will turn on when the H input is active.
On = Auto dehumidification mode. Off = High fan mode.
2.8 - Special factory selection: DIP 2.8 provides special factory selection. Normal position is "On". Do not change selection unless instructed to do so by the factory.

Table 6c: Accessory DIP Switch Settings

DIP 2.1	DIP 2.2	DIP 2.3	ACC1 Relay Option
On	On	On	Cycle with fan
Off	On	On	Digital NSB
On	Off	On	Water Valve - slow opening
On	On	Off	OAD
Off	Off	Off	Reheat Option - Humidistat
Off	On	Off	Reheat Option - Dehumidistat
DIP 2.4	**DIP 2.5**	**DIP 2.6**	**ACC2 Relay Option**
On	On	On	Cycle with compressor
Off	On	On	Digital NSB
On	Off	On	Water Valve - slow opening
On	On	Off	OAD

All other DIP combinations are invalid

CXM and DXM Controls

Safety Features – CXM/DXM Control
The safety features below are provided to protect the compressor, heat exchangers, wiring and other components from damage caused by operation outside of design conditions.

Anti-short cycle protection: The control features a 5 minute anti-short cycle protection for the compressor. **Note: The 5 minute anti-short cycle also occurs at power up.**
Random start: The control features a random start upon power up of 5-80 seconds.
Fault Retry: In Fault Retry mode, the Status LED begins slowly flashing to signal that the control is trying to recover from a fault input. The control will stage off the outputs and then "try again" to satisfy the thermostat input call. Once the thermostat input call is satisfied, the control will continue on as if no fault occurred.
If 3 consecutive faults occur without satisfying the thermostat input call, the control will go into "lockout" mode. The last fault causing the lockout will be stored in memory and can be viewed at the "fault" LED (DXM board) or by going into test mode (CXM board). **Note: FP1/FP2 faults are factory set at only one try.**

Lockout: In lockout mode, the status LED will begin fast flashing. The compressor relay is turned off immediately. Lockout mode can be "soft" reset by turning off the thermostat (or satisfying the call). A "soft" reset keeps the fault in memory but resets the control. A "hard" reset (disconnecting power to the control) resets the control and erases fault memory.

Lockout with emergency heat: While in lockout mode, if W becomes active (CXM), emergency heat mode will occur. If DXM is configured for heat pump thermostat type (DIP 1.3), emergency heat will become active if O/W2 is energized.

High pressure switch: When the high pressure switch opens due to high refrigerant pressures, the compressor relay is de-energized immediately since the high pressure switch is in series with the compressor contactor coil. The high pressure fault recognition is immediate (does not delay for 30 continuous seconds before de-energizing the compressor).
High pressure lockout code = 2
Example: 2 quick flashes, 10 sec pause, 2 quick flashes, 10 sec. pause, etc.

Low pressure switch: The low pressure switch must be open and remain open for 30 continuous seconds during "on" cycle to be recognized as a low pressure fault. If the low pressure switch is open for 30 seconds prior to compressor power up it will be considered a low pressure (loss of charge) fault. The low pressure switch input is bypassed for the initial 120 seconds of a compressor run cycle.
Low pressure lockout code = 3

Water coil low temperature (FP1): The FP1 thermistor temperature must be below the selected low temperature limit setting for 30 continuous seconds during a compressor run cycle to be recognized as a FP1 fault. The FP1 input is bypassed for the initial 120 seconds of a compressor run cycle. FP1 is set at the factory for one try. Therefore, the control will go into lockout mode once the FP1 fault has occurred.
FP1 lockout code = 4

Air coil low temperature (FP2): The FP2 thermistor temperature must be below the selected low temperature limit setting for 30 continuous seconds during a compressor run cycle to be recognized as a FP2 fault. The FP2 input is bypassed for the initial 60 seconds of a compressor run cycle. FP2 is set at the factory for one try. Therefore, the control will go into lockout mode once the FP2 fault has occurred.
FP2 lockout code = 5

Condensate overflow: The condensate overflow sensor must sense overflow level for 30 continuous seconds to be recognized as a CO fault. Condensate overflow will be monitored at all times.
CO lockout code = 6

Over/under voltage shutdown: An over/under voltage condition exists when the control voltage is outside the range of 19VAC to 30VAC. Over/under voltage shut down is a self-resetting safety. If the voltage comes back within range for at least 0.5 seconds, normal operation is restored. This is not considered a fault or lockout. If the CXM/DXM is in over/under voltage shutdown for 15 minutes, the alarm relay will close.
Over/under voltage shut down code = 7

Unit Performance Sentinel-UPS (patent pending): The UPS feature indicates when the heat pump is operating inefficiently. A UPS condition exists when:
a) In heating mode with compressor energized, FP2 is greater than 52°C for 30 continuous seconds, or:
b) In cooling mode with compressor energized, FP1 is greater than 52°C for 30 continuous seconds, or:
c) In cooling mode with compressor energized, FP2 is less than 4.5°C for 30 continuous seconds.

If a UPS condition occurs, the control will immediately go to UPS warning. The status LED will remain on as if the control is in normal mode. Outputs of the control, excluding LED and alarm relay, will NOT be affected by UPS. The UPS condition cannot occur during a compressor off cycle. During UPS warning, the alarm relay will cycle on and off. The cycle rate will be "on" for 5 seconds, "off" for 25 seconds, "on" for 5 seconds, "off" for 25 seconds, etc.
UPS warning code = 8

Swapped FP1/FP2 thermistors: During test mode, the control monitors to see if the FP1 and FP2 thermistors are in the appropriate places. If the control is in test mode, the control will lockout with code 9 after 30 seconds if:

a) The compressor is on in the cooling mode and the FP1 sensor is colder than the FP2 sensor, or:
b) The compressor is on in the heating mode and the FP2 sensor is colder than the FP1 sensor.

Swapped FP1/FP2 thermistor code = 9.

ESD (DXM only): The ESD (Emergency Shut Down) mode can be enabled from an external common signal to terminal ESD to shut down the unit. The green status light will flash code 3 when the unit is in ESD mode. *ESD mode = code 3 (green "status" LED)*

Diagnostic Features - The LED on the CXM board advises the technician of the current status of the CXM control. The LED can display either the current CXM mode or the last fault in memory if in test mode. If there is no fault in memory, the LED will flash Code 1 (when in test mode).

The green status LED and red fault LED on the DXM board advise the technician of the current status of the DXM control. The status LED will indicate the current mode that the DXM control is in. The fault LED will ALWAYS flash a code representing the LAST fault in memory. If there is no fault in memory, the fault LED will flash Code 1. The yellow test LED will turn on when in test mode. **CAUTION: Do not restart units without inspection and remedy of faulting condition. Damage may occur.**

CXM/DXM Control Start-up Operation - The control will not operate until all inputs and safety controls are checked for normal conditions. The compressor will have a 5 minute anti-short cycle delay at power-up. The first time after power-up that there is a call for compressor, the compressor will follow a 5 to 80 second random start delay. After the random start delay and anti-short cycle delay, the compressor relay will be energized. On all subsequent compressor calls, the random start delay is omitted.

Operating Limits

Table 9a: Operating Limits

Starting Limits	TS		TC	
	Cooling	Heating	Cooling	Heating
Air Limits				
Min. ambient air, DB	7ºC	4ºC	7ºC	4ºC
Rated ambient air, DB	27ºC	20ºC	27ºC	20ºC
Max. ambient air, DB	43ºC	29ºC	43ºC	29ºC
Min. entering air, DB/WB	16/10ºC	7ºC	18/10ºC	7.2ºC
Rated entering air, DB/WB	27/19ºC	20ºC	27/19ºC	20ºC
Max. entering air, DB/WB	35/24ºC	27ºC	35/24ºC	27ºC
Water Limits				
Min. entering water	-1ºC	-6.7ºC	-1ºC	-6.7ºC
Normal entering water	10-43ºC	-1 to 21ºC	10-43ºC	-1 to 21ºC
Max. entering water	49ºC	32ºC	49ºC	32ºC
Normal Water Flow	1.6 to 3.2 l/m per kW		1.6 to 3.2 l/m per kW	

Operating Limits

Environment – Units are designed for indoor installation only. Never install units in areas subject to freezing or where humidity levels could cause cabinet condensation (such as unconditioned spaces subject to 100% outside air).

Power Supply – A voltage variation of +/– 10% of nameplate utilization voltage is acceptable.

Determination of operating limits is dependent primarily upon three factors: 1) return air temperature. 2) water temperature, and 3) ambient temperature. When any one of these factors is at minimum or maximum levels, the other two factors should be at normal levels to ensure proper unit operation. Extreme variations in temperature and humidity and/or corrosive water or air will adversely affect unit performance, reliability, and service life. Consult Table 9a for operating limits.

Starting Conditions

Starting conditions are based upon the following notes:

Notes:

1. Conditions in Table 9b are not normal or continuous operating conditions. Minimum/maximum limits are start-up conditions to bring the building space up to occupancy temperatures. Units are not designed to operate under these conditions on a regular basis.
2. Voltage utilization range complies with AHRI Standard 110.

Table 9b: Starting Limits

Starting Limits	TS/TC	
	Cooling	Heating
Air Limits		
Min. ambient air, DB	7ºC	4ºC
Rated ambient air, DB	27ºC	20ºC
Max. ambient air, DB	43ºC	29ºC
Min. entering air, DB/WB	10/7ºC	4.5ºC
Rated entering air, DB/WB	27/19ºC	20ºC
Max. entering air, DB/WB	43/28ºC	27ºC
Water Limits		
Min. entering water	-1ºC	-6.7ºC
Normal entering water	10-43ºC	-1 to 21ºC
Max. entering water	49ºC	32ºC
Normal Water Flow	1.6 to 3.2 l/m per kW	

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Piping System Cleaning and Flushing

Piping System Cleaning and Flushing - Cleaning and flushing the WLHP piping system is the single most important step to ensure proper start-up and continued efficient operation of the system.

Follow the instructions below to properly clean and flush the system:

1. Ensure that electrical power to the unit is disconnected.
2. Install the system with the supply hose connected directly to the return riser valve. Use a single length of flexible hose.
3. Open all air vents. Fill the system with water. DO NOT allow system to overflow. Bleed all air from the system. Pressurize and check the system for leaks and repair as appropriate. ClimaDry®-equipped units have a manual air bleed valve at the top of the reheat coil. This valve must be used to bleed the air from the reheat coil after filling the system, for ClimaDry® to operate properly.
4. Verify that all strainers are in place (ClimateMaster recommends a strainer with a #20 stainless steel wire mesh). Start the pumps, and systematically check each vent to ensure that all air is bled from the system.
5. Verify that make-up water is available. Adjust make-up water as required to replace the air which was bled from the system. Check and adjust the water/air level in the expansion tank.
6. Set the boiler to raise the loop temperature to approximately 30°C. Open a drain at the lowest point in the system. Adjust the make-up water replacement rate to equal the rate of bleed.
7. Refill the system and add trisodium phosphate in a proportion of approximately 1/2 kg per 750 l of water (or other equivalent approved cleaning agent). Reset the boiler to raise the loop temperature to 38°C. Circulate the solution for a minimum of 8 to 24 hours. At the end of this period, shut off the circulating pump and drain the solution. Repeat system cleaning if desired.
8. When the cleaning process is complete, remove the short-circuited hoses. Reconnect the hoses to the proper supply, and return the connections to each of the units. Refill the system and bleed off all air.
9. Test the system pH with litmus paper. The system water should be in the range of pH 6.0 - 8.5 (see table 3). Add chemicals, as appropriate to maintain neutral pH levels.
10. When the system is successfully cleaned, flushed, refilled and bled, check the main system panels, safety cutouts and alarms. Set the controls to properly maintain loop temperatures.

DO NOT use "Stop Leak" or similar chemical agent in this system. Addition of chemicals of this type to the loop water will foul the heat exchanger and inhibit unit operation.

Note: The manufacturer strongly recommends all piping connections, both internal and external to the unit, be pressure tested by an appropriate method prior to any finishing of the interior space or before access to all connections is limited. Test pressure may not exceed the maximum allowable pressure for the unit and all components within the water system. The manufacturer will not be responsible or liable for damages from water leaks due to inadequate or lack of a pressurized leak test, or damages caused by exceeding the maximum pressure rating during installation.

Unit Starting and Operating Conditions

⚠ WARNING! ⚠

WARNING! Polyolester Oil, commonly known as POE oil, is a synthetic oil used in many refrigeration systems including those with HFC-410A refrigerant. POE oil, if it ever comes in contact with PVC or CPVS piping, may cause failure of the PVC/CPVC. PVC/CPVC piping should never be used as supply or return water piping with water source heat pump products containing HFC-410A as system failures and property damage may result.

Unit and System Checkout

BEFORE POWERING SYSTEM, please check the following:

UNIT CHECKOUT

- ❑ Balancing/shutoff valves: Ensure that all isolation valves are open and water control valves are wired.
- ❑ Line voltage and wiring: Verify that voltage is within an acceptable range for the unit and wiring and fuses/breakers are properly sized. Verify that low voltage wiring is complete.
- ❑ Unit control transformer: Ensure that transformer has the properly selected voltage tap.
- ❑ Entering water and air: Ensure that entering water and air temperatures are within operating limits of Table 8a-b.
- ❑ Low water temperature cutout: Verify that low water temperature cut-out on the CXM/DXM control is properly set.
- ❑ Unit fan: Manually rotate fan to verify free rotation and ensure that blower wheel is secured to the motor shaft. Be sure to remove any shipping supports if needed. DO NOT oil motors upon start-up. Fan motors are pre-oiled at the factory. Check unit fan speed selection and compare to design requirements.
- ❑ Condensate line: Verify that condensate line is open and properly pitched toward drain.
- ❑ Water flow balancing: Record inlet and outlet water temperatures for each heat pump upon startup. This check can eliminate nuisance trip outs and high velocity water flow that could erode heat exchangers.
- ❑ Unit air coil and filters: Ensure that filter is clean and accessible. Clean air coil of all manufacturing oils.
- ❑ Unit controls: Verify that CXM or DXM field selection options are properly set.

SYSTEM CHECKOUT

- ❑ System water temperature: Check water temperature for proper range and also verify heating and cooling setpoints for proper operation.
- ❑ System pH: Check and adjust water pH if necessary to maintain a level between 6 and 8.5. Proper pH promotes longevity of hoses and fittings (see table 3).
- ❑ System flushing: Verify that all hoses are connected end to end when flushing to ensure that debris bypasses the unit heat exchanger, water valves and other components. Water used in the system must be potable quality initially and clean of dirt, piping slag, and strong chemical cleaning agents. Verify that all air is purged from the system. Air in the system can cause poor operation or system corrosion.
- ❑ Cooling tower/boiler: Check equipment for proper setpoints and operation.
- ❑ Standby pumps: Verify that the standby pump is properly installed and in operating condition.
- ❑ System controls: Verify that system controls function and operate in the proper sequence.
- ❑ Low water temperature cutout: Verify that low water temperature cut-out controls are provided for the outdoor portion of the loop. Otherwise, operating problems may occur.
- ❑ System control center: Verify that the control center and alarm panel have appropriate setpoints and are operating as designed.
- ❑ Miscellaneous: Note any questionable aspects of the installation.

⚠ CAUTION! ⚠

CAUTION! Verify that ALL water control valves are open and allow water flow prior to engaging the compressor. Freezing of the coax or water lines can permanently damage the heat pump.

⚠ CAUTION! ⚠

CAUTION! To avoid equipment damage, DO NOT leave system filled in a building without heat during the winter unless antifreeze is added to the water loop. Heat exchangers never fully drain by themselves and will freeze unless winterized with antifreeze.

NOTICE! Failure to remove shipping brackets from spring-mounted compressors will cause excessive noise, and could cause component failure due to added vibration.

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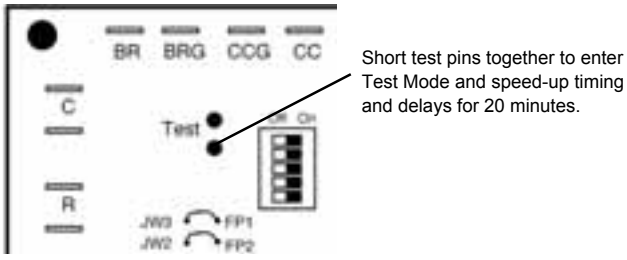
Unit Start-Up Procedure

Unit Start-up Procedure

1. Turn the thermostat fan position to "ON". Blower should start.
2. Balance air flow at registers.
3. Adjust all valves to their full open positions. Turn on the line power to all heat pumps.
4. Room temperature should be within the minimum-maximum ranges of table 9. During start-up checks, loop water temperature entering the heat pump should be between 16°C and 35°C.
5. Two factors determine the operating limits of ClimateMaster heat pumps, (a) return air temperature, and (b) water temperature. When any one of these factors is at a minimum or maximum level, the other factor must be at normal level to insure proper unit operation.
   a. Adjust the unit thermostat to the warmest setting. Place the thermostat mode switch in the "COOL" position. Slowly reduce thermostat setting until the compressor activates.
   b. Check for cool air delivery at the unit grille within a few minutes after the unit has begun to operate. Note: Units have a five minute time delay in the control circuit that can be eliminated on the CXM/DXM control board as shown below in Figure 28. See controls description for details.
   c. Verify that the compressor is on and that the water flow rate is correct by measuring pressure drop through the heat exchanger using the P/T plugs and comparing to tables 10a through 10e.
   d. Check the elevation and cleanliness of the condensate lines. Dripping may be a sign of a blocked line. Check that the condensate trap is filled to provide a water seal.
   e. Refer to table 17. Check the temperature of both entering and leaving water. If temperature is within range, proceed with the test. Verify correct water flow by comparing unit pressure drop across the heat exchanger versus the data in tables 10b and c. Heat of rejection (HR) can be calculated and compared to submittal data capacity pages. The formula for HR for systems with water is as follows: HR (kW) = TD x l/s x 4.18,where TD is the temperature difference between the entering and leaving water, and l/s is the flow rate, determined by comparing the pressure drop across the heat exchanger to tables 10b,c..
   f. Check air temperature drop across the air coil when compressor is operating. Air temperature drop should be between 8°C and 14°C.
   g. Turn thermostat to "OFF" position. A hissing noise indicates proper functioning of the reversing valve.
6. Allow five (5) minutes between tests for pressure to equalize before beginning heating test.
   a. Adjust the thermostat to the lowest setting. Place the thermostat mode switch in the "HEAT" position.
   b. Slowly raise the thermostat to a higher temperature until the compressor activates.
   c. Check for warm air delivery within a few minutes after the unit has begun to operate.
   d. Refer to table 17. Check the temperature of both entering and leaving water. If temperature is within range, proceed with the test. Verify correct water flow by comparing unit pressure drop across the heat exchanger versus the data in tables 10b, c. Heat of extraction (HE) can be calculated and compared to submittal data capacity pages. The formula for HE for systems with water is as follows: HE (kW) = TD x l/s x 4.18, where TD is the temperature difference between the entering and leaving water, and l/s is the flow rate in U.S. GPM, determined by comparing the pressure drop across the heat exchanger to tables 10b and c.
   e. Check air temperature rise across the air coil when compressor is operating. Air temperature rise should be between 11°C and 17°C.
   f. Check for vibration, noise, and water leaks.
7. If unit fails to operate, perform troubleshooting analysis (see troubleshooting section). If the check described fails to reveal the problem and the unit still does not operate, contact a trained service technician to insure proper diagnosis and repair of the equipment.
8. When testing is complete, set system to maintain desired comfort level.
9. BE CERTAIN TO FILL OUT AND FORWARD ALL WARRANTY REGISTRATION PAPERS TO CLIMATEMASTER.

Note: If performance during any mode appears abnormal, refer to the CXM/DXM section or troubleshooting section of this manual. To obtain maximum performance, the air coil should be cleaned before start-up. A 10% solution of dishwasher detergent and water is recommended.

Figure 28: Test Mode Pins



⚠ WARNING! ⚠

WARNING! When the disconnect switch is closed, high voltage is present in some areas of the electrical panel. Exercise caution when working with energized equipment.

⚠ CAUTION! ⚠

CAUTION! Verify that ALL water control valves are open and allow water flow prior to engaging the compressor. Freezing of the coax or water lines can permanently damage the heat pump.

Table 10b: TS Coax Water Pressure Drop

Model	l/s	Pressure Drop, kPa*			
		-1°C	10°C	21°C	32°C
009	0.088	5.5	4.8	4.1	4.1
	0.132	10.3	9.7	8.3	7.6
	0.777	18.6	16.5	15.2	13.1
012	0.114	4.1	3.4	2.8	2.1
	0.164	14.5	13.1	11.0	9.7
	0.221	26.2	23.4	20.7	17.9
018	0.176	4.8	3.4	2.1	1.4
	0.258	14.5	11.7	9.7	7.6
	0.347	24.1	19.3	16.6	13.8
024	0.252	10.3	9.0	7.6	6.9
	0.378	21.4	17.9	15.9	14.5
	0.504	35.2	29.7	26.2	23.4
030	0.252	10.3	9.0	7.6	6.9
	0.378	21.4	17.9	15.9	14.5
	0.504	35.2	29.7	26.2	23.4
036	0.284	11.7	9.0	7.6	6.2
	0.428	22.8	21.4	20.0	17.9
	0.567	39.3	35.9	33.1	30.3
042	0.347	7.6	6.2	5.5	4.8
	0.523	15.2	14.5	13.8	12.4
	0.693	26.9	24.8	22.1	21.4
048	0.378	9.0	7.6	6.9	6.2
	0.567	17.9	17.2	15.9	15.2
	0.756	31.0	29.0	26.2	24.1
060	0.473	4.1	2.8	2.1	1.4
	0.712	15.9	14.5	13.8	12.4
	0.945	33.1	29.7	26.9	24.1
070	0.523	16.6	13.8	11.7	11.0
	0.781	35.9	31.0	27.6	26.2
	1.040	55.2	48.3	43.4	41.4

***Note: To convert kPa to millibars, multiply by 10.**

Table 10c: TC Coax Water Pressure Drop

Model	l/s	Pressure Drop, kPa			
		-1°C	10°C	21°C	32°C
006	0.05	3.7	2.3	1.6	1.6
	0.07	5.3	3.5	2.7	2.2
	0.09	8.8	6.1	4.8	4.0
009	0.07	9.0	4.4	2.8	1.9
	0.11	14.1	9.4	7.4	6.2
	0.14	24.3	17.9	14.7	12.7
012	0.09	12.8	7.6	5.3	4.1
	0.15	25.0	17.8	14.3	12.1
	0.19	46.1	34.3	28.3	24.5
015	0.12	6.9	4.4	3.4	2.8
	0.18	12.4	9.3	7.6	6.9
	0.24	22.7	17.5	14.7	13.1
018	0.14	14.5	9.9	7.6	6.2
	0.21	23.4	17.6	14.7	12.4
	0.28	40.6	31.5	26.9	23.4
024	0.19	15.2	11.6	9.6	8.3
	0.28	27.6	22.2	19.3	17.2
	0.38	49.6	40.6	35.8	32.4
030	0.24	9.0	6.1	4.8	4.1
	0.35	15.8	12.5	10.3	9.6
	0.47	28.9	23.2	20	17.9
036	0.28	12.4	9.6	8.3	6.9
	0.43	21.4	16.8	14.7	13.1
	0.57	37.2	30.0	26.2	23.4
042	0.33	15.8	12.1	10.3	9.0
	0.50	29.6	24.2	26.4	19.3
	0.66	54.4	44.8	39.3	35.8
048	.038	12.4	10.1	9.0	8.3
	0.57	23.4	20.4	18.6	17.9
	0.76	42.7	37.9	35.1	35.1
060	0.47	23.4	19.2	16.5	15.2
	0.71	46.9	40.8	37.2	34.5
	0.95	86.8	76.8	71.0	66.1

Table 17: Water Temperature Change Through Heat Exchanger

Water Flow, l/m	Rise, Cooling °C	Drop, Heating °C
For Closed Loop: Ground Source or Closed Loop Systems at 3.2 l/m per kW	5 - 6.7	2.2 - 4.4
For Open Loop: Ground Water Systems at 1.6 l/m per kW	11.1 - 14.4	5.6 - 9.4

Preventive Maintenance

Water Coil Maintenance
(Direct ground water applications only)
If the system is installed in an area with a known high mineral content (125 P.P.M. or greater) in the water, it is best to establish a periodic maintenance schedule with the owner so the coil can be checked regularly. Consult the well water applications section of this manual for a more detailed water coil material selection. Should periodic coil cleaning be necessary, use standard coil cleaning procedures, which are compatible with the heat exchanger material and copper water lines. Generally, the more water flowing through the unit, the less chance for scaling. Therefore, 1.6 l/m per kW is recommended as a minimum flow. Minimum flow rate for entering water temperatures below 10°C is 2.2 l/m per kW.

Water Coil Maintenance
(All other water loop applications)
Generally water coil maintenance is not needed for closed loop systems. However, if the piping is known to have high dirt or debris content, it is best to establish a periodic maintenance schedule with the owner so the water coil can be checked regularly. Dirty installations are typically the result of deterioration of iron or galvanized piping or components in the system. Open cooling towers requiring heavy chemical treatment and mineral buildup through water use can also contribute to higher maintenance. Should periodic coil cleaning be necessary, use standard coil cleaning procedures, which are compatible with both the heat exchanger material and copper water lines. Generally, the more water flowing through the unit, the less chance for scaling. However, flow rates over 3.9 l/m per kW can produce water (or debris) velocities that can erode the heat exchanger wall and ultimately produce leaks.

Hot Water Generator Coils
See water coil maintenance for ground water units. If the potable water is hard or not chemically softened, the high temperatures of the desuperheater will tend to scale even quicker than the water coil and may need more frequent inspections. In areas with extremely hard water, a HWG is not recommended.

Filters
Filters must be clean to obtain maximum performance. Filters should be inspected every month under normal operating conditions and be replaced when necessary. Units should never be operated without a filter.

Washable, high efficiency, electrostatic filters, when dirty, can exhibit a very high pressure drop for the fan motor and reduce air flow, resulting in poor performance. It is especially important to provide consistent washing of these filters (in the opposite direction of the normal air flow) once per month using a high pressure wash similar to those found at self-serve car washes.

Condensate Drain
In areas where airborne bacteria may produce a "slimy" substance in the drain pan, it may be necessary to treat the drain pan chemically with an algaecide approximately every three months to minimize the problem. The condensate pan may also need to be cleaned periodically to insure indoor air quality. The condensate drain can pick up lint and dirt, especially with dirty filters. Inspect the drain twice a year to avoid the possibility of plugging and eventual overflow.

Compressor
Conduct annual amperage checks to insure that amp draw is no more than 10% greater than indicated on the serial plate data.

Fan Motors
All units have lubricated fan motors. Fan motors should never be lubricated unless obvious, dry operation is suspected. Periodic maintenance oiling is not recommended, as it will result in dirt accumulating in the excess oil and cause eventual motor failure. Conduct annual dry operation check and amperage check to insure amp draw is no more than 10% greater than indicated on serial plate data.

Air Coil
The air coil must be cleaned to obtain maximum performance. Check once a year under normal operating conditions and, if dirty, brush or vacuum clean. Care must be taken not to damage the aluminum fins while cleaning. **CAUTION: Fin edges are sharp.**

Cabinet
Do not allow water to stay in contact with the cabinet for long periods of time to prevent corrosion of the cabinet sheet metal. Generally, vertical cabinets are set up from the floor 7 - 8 cm to prevent water from entering the cabinet. The cabinet can be cleaned using a mild detergent.

Refrigerant System
To maintain sealed circuit integrity, do not install service gauges unless unit operation appears abnormal. Reference the operating charts for pressures and temperatures. Verify that air and water flow rates are at proper levels before servicing the refrigerant circuit.

Packaged Units
Revised: 02 January, 2013

Functional Troubleshooting

Fault	Htg	Clg	Possible Cause	Solution
Main power problems	X	X	Green Status LED Off	Check line voltage circuit breaker and disconnect.
				Check for line voltage between L1 and L2 on the contactor.
				Check for 24VAC between R and C on CXM/DXM'
				Check primary/secondary voltage on transformer.
HP Fault Code 2 **High Pressure**		X	Reduced or no water flow in cooling	Check pump operation or valve operation/setting.
				Check water flow adjust to proper flow rate.
		X	Water Temperature out of range in cooling	Bring water temp within design parameters.
	X		Reduced or no air flow in heating	Check for dirty air filter and clean or replace.
				Check fan motor operation and airflow restrictions.
				Dirty Air Coil- construction dust etc.
				Too high of external static. Check static vs blower table.
	X		Air temperature out of range in heating	Bring return air temp within design parameters.
	X	X	Overcharged with refrigerant	Check superheat/subcooling vs typical operating condition table.
	X	X	Bad HP Switch	Check switch continuity and operation. Replace.
LP/LOC Fault Code 3 **Low Pressure / Loss of Charge**	X	X	Insufficient charge	Check for refrigerant leaks
	X		Compressor pump down at start-up	Check charge and start-up water flow.
LT1 Fault Code 4 **Water coil low temperature limit**	X		Reduced or no water flow in heating	Check pump operation or water valve operation/setting.
				Plugged strainer or filter. Clean or replace..
				Check water flow adjust to proper flow rate.
	X		Inadequate antifreeze level	Check antifreeze density with hydrometer.
	X		Improper temperature limit setting (30°F vs 10°F [-1°C vs -2°C])	Clip JW3 jumper for antifreeze (10°F [-12°C]) use.
	X		Water Temperature out of range	Bring water temp within design parameters.
	X	X	Bad thermistor	Check temp and impedance correlation per chart
LT2 Fault Code 5 **Air coil low temperature limit**		X	Reduced or no air flow in cooling	Check for dirty air filter and clean or replace.
				Check fan motor operation and airflow restrictions.
				Too high of external static. Check static vs blower table.
		X	Air Temperature out of range	Too much cold vent air? Bring entering air temp within design parameters.
		X	Improper temperature limit setting (30°F vs 10°F [-1°C vs -12°C])	Normal airside applications will require 30°F [-1°C] only.
	X	X	Bad thermistor	Check temp and impedance correlation per chart.
Condensate Fault Code 6	X	X	Blocked drain	Check for blockage and clean drain.
	X	X	Improper trap	Check trap dimensions and location ahead of vent.
		X	Poor drainage	Check for piping slope away from unit.
				Check slope of unit toward outlet.
				Poor venting. Check vent location.
		X	Moisture on sensor	Check for moisture shorting to air coil.
	X	X	Plugged air filter	Replace air filter.
	x	X	Restricted Return Air Flow	Find and eliminate restriction. Increase return duct and/or grille size.
Over/Under Voltage Code 7 **(Auto resetting)**	X	X	Under Voltage	Check power supply and 24VAC voltage before and during operation.
				Check power supply wire size.
				Check compressor starting. Need hard start kit?
				Check 24VAC and unit transformer tap for correct power supply voltage.
	X	X	Over Voltage	Check power supply voltage and 24VAC before and during operation.
				Check 24VAC and unit transformer tap for correct power supply voltage.
Unit Performance Sentinel Code 8	X		Heating mode FP2>125°F [52°C]	Check for poor air flow or overcharged unit.
		X	Cooling Mode FP1>125°F [52°C] OR FP2< 40ºF [4ºC])	Check for poor water flow, or air flow.
No Fault Code Shown	X	X	No compressor operation	See "Only Fan Operates".
	X	X	Compressor overload	Check and replace if necessary.
	X	X	Control board	Reset power and check operation.
Unit Short Cycles	X	X	Dirty air filter	Check and clean air filter.
	X	X	Unit in "test mode"	Reset power or wait 20 minutes for auto exit.
	X	X	Unit selection	Unit may be oversized for space. Check sizing for actual load of space.
	X	X	Compressor overload	Check and replace if necessary
Only Fan Runs	X	X	Thermostat position	Ensure thermostat set for heating or cooling operation.
	X	X	Unit locked out	Check for lockout codes. Reset power.
	X	X	Compressor Overload	Check compressor overload. Replace if necessary.
	X	X	Thermostat wiring	Check thermostat wiring at heat pump. Jumper Y and R for compressor operation in test mode.
Only Compressor Runs	X	X	Thermostat wiring	Check G wiring at heat pump. Jumper G and R for fan operation
	X	X	Fan motor relay	Jumper G and R for fan operation. Check for Line voltage across BR contacts.
	X	X		Check fan power enable relay operation (if present).
	X	X	Fan motor	Check for line voltage at motor. Check capacitor.
	X	X	Thermostat wiring	Check thermostat wiring at heat pump. Jumper Y and R for compressor operation in test mode
Unit Doesn't Operate in Cooling		X	Reversing valve	Set for cooling demand and check 24VAC on RV coil and at CXM/DXM board.
				If RV is stuck, run high pressure up by reducing water flow and while operating engage and disengage RV coil voltage to push valve.
		X	Thermostat setup	Check for 'O' RV setup not 'B'.
		X	Thermostat wiring	Check O wiring at heat pump. Jumper O and R for RV coil 'click'.
		X	Thermostat wiring	Put thermostat in cooling mode. Check 24 VAC on O (check between C and O); check for 24 VAC on W (check between W and C). There should be voltage on O, but not on W. If voltage is present on W, thermostat may be bad or wired incorrectly.

Performance Troubleshooting

Performance Troubleshooting	Htg	Clg	Possible Cause	Solution
Insufficient capacity/ Not cooling or heating	X	X	Dirty filter	Replace or clean.
	X		Reduced or no air flow in heating	Check for dirty air filter and clean or replace.
				Check fan motor operation and airflow restrictions.
				Too high of external static. Check static vs. blower table.
		X	Reduced or no air flow in cooling	Check for dirty air filter and clean or replace.
				Check fan motor operation and airflow restrictions.
				Too high of external static. Check static vs. blower table.
	X	X	Leaky duct work	Check supply and return air temperatures at the unit and at distant duct registers if significantly different, duct leaks are present.
	X	X	Low refrigerant charge	Check superheat and subcooling per chart.
	X	X	Restricted metering device	Check superheat and subcooling per chart. Replace.
		X	Defective reversing valve	Perform RV touch test.
	X	X	Thermostat improperly located	Check location and for air drafts behind stat.
	X	X	Unit undersized	Recheck loads & sizing. Check sensible clg. load and heat pump capacity.
	X	X	Scaling in water heat exchanger	Perform scaling check and clean if necessary.
	X	X	Inlet water too hot or too cold	Check load, loop sizing, loop backfill, ground moisture.
High Head Pressure	X		Reduced or no air flow in heating	Check for dirty air filter and clean or replace.
				Check fan motor operation and air flow restrictions.
				Too high of external static. Check static vs. blower table.
		X	Reduced or no water flow in cooling	Check pump operation or valve operation/setting.
				Check water flow. Adjust to proper flow rate.
		X	Inlet water too hot	Check load, loop sizing, loop backfill, ground moisture.
	X		Air temperature out of range in heating	Bring return air temperature within design parameters.
		X	Scaling in water heat exchanger	Perform scaling check and clean if necessary.
	X	X	Unit overcharged	Check superheat and subcooling. Re-weigh in charge.
	X	X	Non-condensables in system	Vacuum system and re-weigh in charge.
	X	X	Restricted metering device.	Check superheat and subcooling per chart. Replace.
Low Suction Pressure	X		Reduced water flow in heating.	Check pump operation or water valve operation/setting.
				Plugged strainer or filter. Clean or replace.
				Check water flow. Adjust to proper flow rate.
	X		Water temperature out of range.	Bring water temperature within design parameters.
		X	Reduced air flow in cooling.	Check for dirty air filter and clean or replace.
				Check fan motor operation and air flow restrictions.
				Too high of external static. Check static vs. blower table.
		X	Air temperature out of range	Too much cold vent air? Bring entering air temperature within design parameters.
	X	X	Insufficient charge	Check for refrigerant leaks.
Low Discharge Air Temperature in Heating	X		Too high of air flow	Check fan motor speed selection and air flow chart.
	X		Poor performance	See 'Insufficient Capacity'
High humidity		X	Too high of air flow	Check fan motor speed selection and airflow chart.
		X	Unit oversized	Recheck loads & sizing. Check sensible clg load and heat pump capacity.

Packaged Units
Revised: 02 January, 2013

Functional Troubleshooting - S-I Units

HEATING CYCLE ANALYSIS -

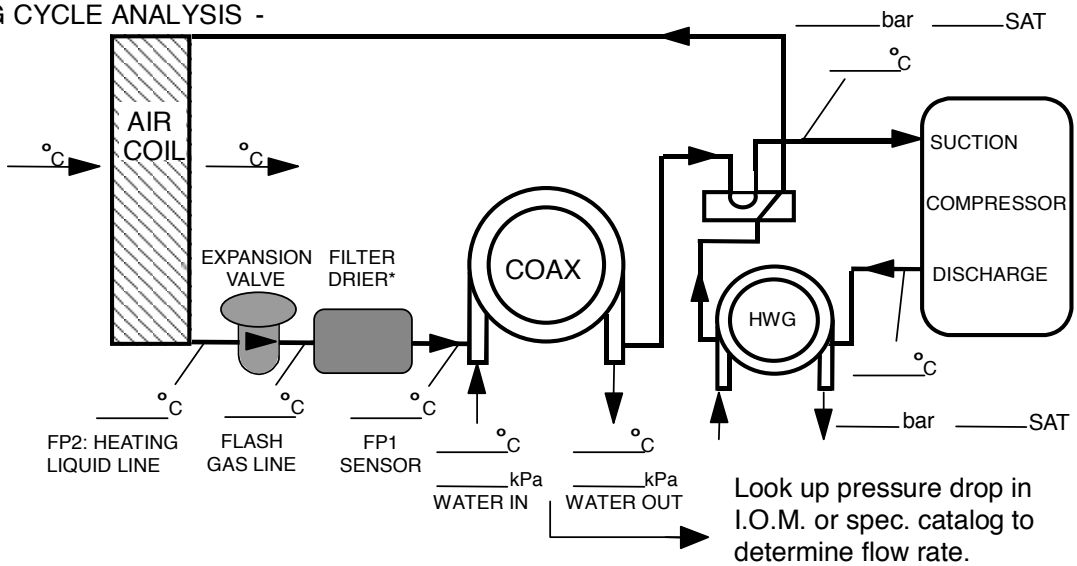
Refrigerant Type:

HFC-410A

Voltage: _____

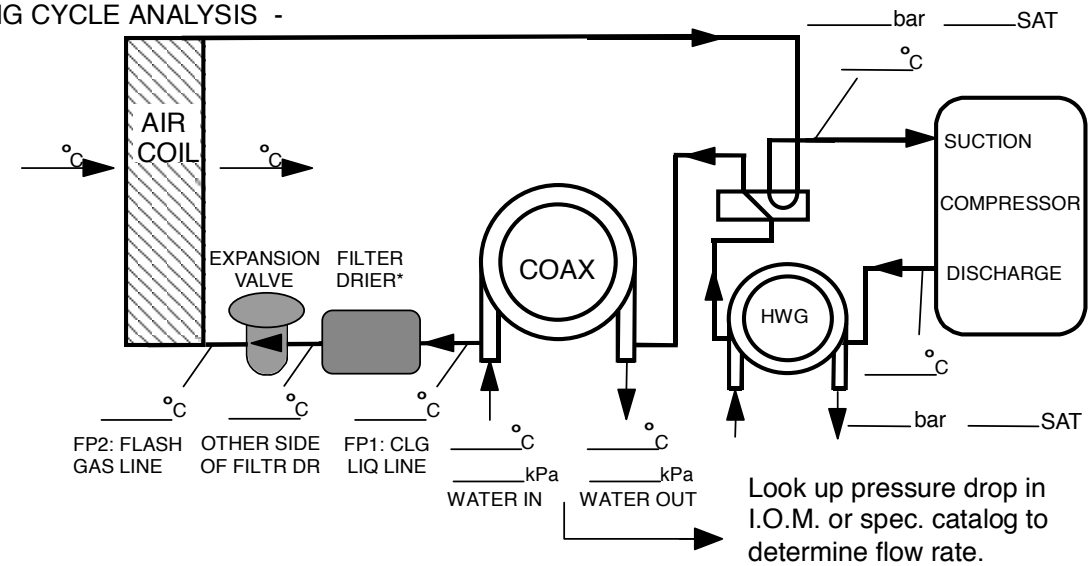
Comp Amps: _____

Total Amps: _____



Look up pressure drop in I.O.M. or spec. catalog to determine flow rate.

COOLING CYCLE ANALYSIS -



Look up pressure drop in I.O.M. or spec. catalog to determine flow rate.

Heat of Extraction (Absorption) or Heat of Rejection =

_____flow rate (l/s) x _____ temp. diff. (deg. C) x _____ fluid factor† = _____ (kW)

Superheat = Suction temperature - suction saturation temp. = _____ (deg C)

Subcooling = Discharge saturation temp. - liquid line temp. = _____ (deg C)

† Use 4.18 for water, 4.05 for antifreeze

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Note: Never connect refrigerant gauges during startup procedures. Conduct water-side analysis using P/T ports to determine water flow and temperature difference. If water-side analysis shows poor performance, refrigerant troubleshooting may be required. Connect refrigerant gauges as a last resort.

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GRANT OF LIMITED EXPRESS WARRANTY

CM warrants CM products purchased and installed outside the United States of America ("U.S.A.") and Canada to be free from material defects in materials and workmanship under normal use and maintenance as follows: (1) All complete air conditioning, heating or heat pump units built or sold by CM for twelve (12) months from date of unit start-up or eighteen (18) months from date of shipment (from CM's factory), whichever comes first; and, (2) Repair and replacement parts, which are not supplied under warranty, for ninety (90) days from date of shipment (from factory).

Warranty parts shall be furnished by CM if ordered through an authorized sales representative of CM ("Representative") within sixty (60) days after the failure of the part. If CM determines that a parts order qualifies for replacement under CM's warranty, such parts shall be shipped freight prepaid to the Representative or the ultimate user, as requested by Representative. All duties, taxes and other fees shall be paid by the ultimate user through the Representative.

If requested by CM, all defective parts shall be returned to CM's factory in Oklahoma City, Oklahoma, U.S.A, freight and duty prepaid, not later than sixty (60) days after the date of the request. If the defective part is not timely returned or if CM determines the part to not be defective or otherwise not to qualify under CM's Limited Express Warranty, CM shall invoice Customer the costs for the parts furnished, including freight. The warranty on any part repaired or replaced under warranty expires at the end of the original warranty period.

This warranty does not cover and does not apply to: (1) Air filters, fuses, refrigerant, fluids, oil; (2) Products relocated after initial installation; (3) Any portion or component of any system that is not supplied by CM, regardless of the cause of the failure of such portion or component; (4) Products on which the unit identification tags or labels have been removed or defaced; (5) Products on which payment by Customer to CM or its distributors or Representatives, or the Customer's seller is in default; (6) Products which have defects or damage which result from improper installation, wiring, electrical imbalance characteristics or maintenance; or from parts or components manufactured by others; or are caused by accident, misuse, negligence, abuse, fire, flood, lightning, alteration or misapplication of the product; (7) Products which have defects or damage which result from a contaminated or corrosive air or liquid supply, operation at abnormal temperatures or flow rates, or unauthorized opening of the refrigerant circuit; (8) Mold, fungus or bacteria damages; (9) Products subjected to corrosion or abrasion; (10) Products, parts or components manufactured or supplied by others; (11) Products which have been subjected to misuse, negligence or accidents; (12) Products which have been operated in a manner contrary to CM's printed instructions; (13) Products which have defects, damage or insufficient performance as a result of insufficient or incorrect system design or the improper application, installation, or use of CM's products; or (14) Electricity or fuel costs, or any increases or unrealized savings in same, for any reason.

CM is not responsible for: (1) The cost of any fluids, refrigerant or other system components, or the associated labor to repair or replace the same, which is incurred as a result of a defective part covered by CM's Limited Express Warranty; (2) The cost of labor, refrigerant, materials or service incurred in diagnosis and removal of the defective part, or in obtaining and replacing the new or repaired part; (3) Transportation costs of the defective part from the installation site to CM or of the return of any part not covered by CM's Limited Express Warranty; or (4) The costs of normal maintenance.

Limitation: This Limited Express Warranty is given in lieu of all other warranties. If, notwithstanding the disclaimers contained herein, it is determined by a court or other qualified judicial body that other warranties exist, any such warranty, including without limitation any express warranty or any implied warranty of fitness for particular purpose and merchantability, shall be limited to the duration of the Limited Express Warranty. This Limited Express Warranty does not exclude any warranty that is mandatory and that may not be excluded under applicable imperative law.

LIMITATION OF REMEDIES

In the event of a breach of this Limited Express Warranty or any warranty that is mandatory under applicable imperative law, CM will only be obligated at CM's option to either repair the failed part or unit or to furnish a new or rebuilt part or unit in exchange for the part or unit which has failed. If after written notice to CM's factory in Oklahoma City, Oklahoma, U.S.A. of each defect, malfunction or other failure and a reasonable number of attempts by CM to correct the defect, malfunction or other failure and the remedy fails of its essential purpose, CM shall refund the purchase price paid to CM in exchange for the return of the sold good(s). Said refund shall be the maximum liability of CM. **TO THE FULLEST EXTENT PERMITTED BY APPLICABLE LAW, THIS REMEDY IS THE SOLE AND EXCLUSIVE REMEDY OF THE CUSTOMER AGAINST CM FOR BREACH OF CONTRACT, FOR THE BREACH OF ANY WARRANTY OR FOR CM'S NEGLIGENCE OR IN STRICT LIABILITY.**

LIMITATION OF LIABILITY

CM shall have no liability for any damages if CM's performance is delayed for any reason or is prevented to any extent by any event such as, but not limited to: any war, civil unrest, government restrictions or restraints, strikes, or work stoppages, fire, flood, accident, allocation, shortages of transportation, fuel, materials, or labor, acts of God or any other reason beyond the sole control of CM. **TO THE FULLEST EXTENT PERMITTED BY APPLICABLE LAW AND SUBJECT TO THE NEXT SENTENCE, CM EXPRESSLY DISCLAIMS AND EXCLUDES ANY LIABILITY FOR LOSS OF PROFITS, LOSS OF BUSINESS OR GOODWILL, CONSEQUENTIAL, INCIDENTAL, SPECIAL, LIQUIDATED, OR PUNITIVE DAMAGE IN CONTRACT, FOR BREACH OF ANY EXPRESS OR IMPLIED WARRANTY, OR IN TORT, WHETHER FOR CM's NEGLIGENCE OR AS STRICT LIABILITY.** Nothing in this Agreement is intended to exclude CM's liability for death, personal injury or fraud.

OBTAINING WARRANTY PERFORMANCE

Normally, the contractor or service organization who installed the products will provide warranty performance for the owner. Should the installer be unavailable, contact any CM recognized Representative. If assistance is required in obtaining warranty performance, write or call:

Climate Master, Inc. • Customer Service • 7300 S.W. 44th Street • Oklahoma City, Oklahoma, U.S.A. 73179 • (405) 745-6000 • FAX (405) 745-6068

NOTE: Some countries do not allow limitations on how long an implied warranty lasts, or the limitation or exclusions of consequential or incidental damages, so the foregoing exclusions and limitations may not apply to you. This warranty gives you specific legal rights, and you may also have other rights which vary from state to state and country to country.

Please refer to the CM Installation, Operation and Maintenance Manual for operating and maintenance instructions.

Rev.: 10/09

LC079

Packaged Units
Revised: 02 January, 2013

Revision History

Date	Item	Description
02 January, 2013	POE Oil Warning	Added
06 October, 2011	Unit Size 006-012	Added to Table 10c.
09 August, 2011	Unit Maximum Working Water Pressure	Updated to Reflect New Safeties
20 October, 2010	Decoders, Wiring Diagrams	Updated
23 August, 2010	Size 006 and 012	Added
13 August, 2010	I-P Units,Domestic measurements	Removed
11 January, 2010	ECM and 006 References	Removed
15 November, 2009	'Safety Features - CXM/DXM Controls' Section	Updated
30 April, 2009	All	First Published

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